



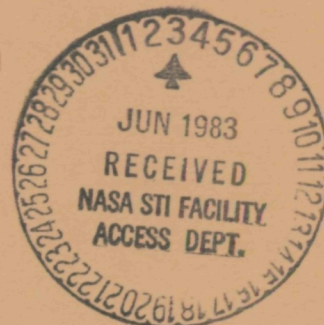
Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

50  
NASA SP-7011(245)  
May 1983

National Aeronautics and  
Space Administration



25th Anniversary  
1958-1983



# Aerospace Medicine & Biology

(NASA-SP-7011(245)) AEROSPACE MEDICINE AND N83-26447  
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## ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)

N83-16275 - N83-18635

IAA (A-10000 Series)

A83-19624 - A83-23297

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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

**(Supplement 245)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1983 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



Scientific and Technical Information Branch

1983

**National Aeronautics and Space Administration**

Washington, DC

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 363 reports, articles and other documents announced during April 1983 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1983 Supplements.

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## TYPICAL CITATION AND ABSTRACT FROM STAR

**NASA SPONSORED DOCUMENT** →  
**NASA ACCESSION NUMBER** → N83-11702\*# National Aeronautics and Space Administration  
 Lyndon B Johnson Space Center, Houston, Tex.  
**TITLE** → **MEDICAL OPERATIONS AND LIFE SCIENCES ACTIVITIES ON SPACE STATION**  
**AUTHOR** → P C JOHNSON, ed and J. A. MASON, ed Oct. 1982 47 p  
 (NASA-TM-58248, S-518, NAS 1 15 58248) Avail: NTIS HC  
**REPORT NUMBER** → A03/MF A01 CSCL 05H  
 Space station health maintenance facilities, habitability, personnel, and research in the medical sciences and in biology are discussed. It is assumed that the space station structure will consist of several modules, each being consistent with Orbiter payload bay limits in size, weight, and center of gravity Author  
**AVAILABILITY SOURCE** →  
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## TYPICAL CITATION AND ABSTRACT FROM IAA

**AIAA ACCESSION NUMBER** → A83-10555  
**AUTHOR** → V G POPOV (Vsesoiuznyi Nauchno-Issledovatel'skii Biotekhnicheskii Institut, Moscow, USSR) Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, Aug 1982, p 84-88 In Russian refs  
**TITLE** → **AN ANALYSIS OF THE PARAMETERS OF THE IMMUNOREACTIVE CURVE [ANALIZ PARAMETROV IMMUNOREAKTIVNOI KRIVOI]**  
**PUBLICATION DATE**  
**TITLE OF PERIODICAL**  
 A simple mathematical model of the vaccination process is developed on the basis of an analysis of the general principles of the interaction between the immune systems of macroorganisms and the causative agents of infective diseases. The parameters of this model can be used for developing objective and standard criteria for evaluating vaccines according to their immunogenicity, reactogenicity, and safety. It is also found to be expedient to use immunological curves for selecting the optimal method of vaccination, as well as for the comparative evaluation of the receptivity of various vaccinated objects to immunizing agents.

N B

# AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 245))

MAY 1983

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## LIFE SCIENCES (GENERAL)

Includes genetics

A83-19643

**A PRONOUNCED DECREASE IN THE METABOLISM OF WARM-BLOODED ANIMALS CAUSED BY ENDOGENOUS SUBSTANCES FROM THE TISSUES OF HIBERNANTS IN THE STATE OF HIBERNATION [EFFEKT VYRAZHENNOGO SNIZHENIIA METABOLIZMA U TEPIKROVNYKH ENDOGENNYMI VESHCHESTVAMI IZ TKANEI ZIMOSPIASHCHIKH V SOSTOIANII SPIACHKI]**  
G R IVANITSKII, S G KOLAEVA, I U F PASTUKHOV, L I KRAMAROVA, G G SAPOZHKOVA, I E CHEPKASOV, F E ILIASOV, and E N ILIASOVA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Akademiiia Nauk SSSR, Doklady, vol 267, no 4, 1982, p 978-980 In Russian refs

A83-19644

**THE ABIOTIC SYNTHESIS OF PEPTIDES ON ORGANIC MATRICES OF THE MELANOID TYPE [ABIOGENNYI SINTEZ PEPTIDOV NA ORGANICHESKIKH MATRITSAKH MELANOIDINOVOGO TIPA]**  
T A TELEGINA, L N MOISEEVA, and T E PAVLOVSKAIA (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR) Akademiiia Nauk SSSR, Doklady, vol 267, no 4, 1982, p 987-991 In Russian refs

The efficiency of a melanoid pigment, obtained from simple organic compounds by the action of UV radiation (Telegina et al, 1980), is evaluated as an organic matrix in the reactions of the abiotic photochemical synthesis of peptides from the simple amino acid alanine. The synthesis of peptides from alanine is examined using an inorganic (silicate) matrix or an organic (melanoid) matrix and with the action of UV-rays or with no irradiation. The products of the various experiments were analyzed by their UV spectra, the length of the peptides produced, and the yield of products. Results show that the photochemical process of the synthesis of peptides from alanine is more effective on the melanoid matrix than on the inorganic (silicate) matrix. It is concluded that the abiotically synthesized melanoid polymer performs both adsorbing and catalytic functions, and that this type of polymer can serve as a matrix for the abiotic synthesis of peptides. N B

A83-19645

**GOAL-DIRECTED MOVEMENTS OF CAT'S EYES IN RESPONSE TO ELECTRICAL STIMULATION OF THE LATERAL GENICULATE BODY [TSELENAPRAVLENNYE DVIZHENIIA GLAZ KOSHKI V OTVET NA ELEKTRICHESKUII STIMULIATSIIU NARUZHNOGO KOLENCHATOGO TELA]**  
N F PODVIGIN, V IA SVETLOVA, E V EVPIATEVA, and G I NOVIKOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Akademiiia Nauk SSSR, Doklady, vol 267, no 4, 1982, p 999-1001 In Russian

A83-19920

**THE PREVENTION OF DISORDERS OF THE CONTRACTILE FUNCTION OF THE HEART DURING STRESS BY MEANS OF PRELIMINARY ADAPTATION OF THE ANIMALS TO HYPOXIA [PREDUPREZHDENIE NARUSHENII SOKRATITEL'NOI FUNKTSII SERDTSA PRI STRESSE S POMOSHCH'IU PREDVARITEL'NOI ADAPTATSII ZHIVOTNYKH K GIPOKSII]**  
F Z MEERSON and A I SAULIA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Nov-Dec 1982, p 50-55 In Russian refs

The effect of emotional and painful stress on the contractile function of the papillary muscles of animals, its reactivity to the natural antagonist  $Ca^{2+}$ , and the possibility of preventing disorders of the heart contractile function by prior adaptation to hypoxia are investigated. Results show that emotional and pain stress lead to a reduction of approximately 40% in the amplitude and rate of papillary muscle contraction, while the rate of papillary muscle relaxation decreases by a smaller amount. In addition to the depression of the main parameters of the papillary muscle contraction, it was found that a significant increase of the negative isotropic effect of  $Na^{+}$  excess occurred in the animals subjected to stress. Adaptation to hypoxia acted to prevent disorders of the contractile function in animals subjected to stress, due to the inhibition of the activation of the peroxidation of lipids. N B

A83-19921

**THE CHANGES IN THE ERYTHROPOIESIS-STIMULATING ACTION OF THE ERYTHROCYTIC FACTORS DURING THE BLOCKING OF CELLS OF THE MONONUCLEAR PHAGOCYTE SYSTEM [OB IZMENENII ERITROPOEZSTIMULIRUIUSHCHEGO DEISTVIA ERITROTSITARNYKH FAKTOROV PRI BLOKADE KLETOK SISTEMY MONONUKLEARNYKH FAGOTSITOV]**  
N M NOVIKOV (Altaiiskii Meditsinskii Institut, Barnaul, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Nov-Dec 1982, p 56-59 In Russian refs

The effects of hypoxic hypoxia and erythrocytic factors on erythropoiesis in animals with blocked cells of the mononuclear phagocyte system are investigated. It is found that the injection of erythrocytes at the stage of prehemolysis into rats with blockages of the mononuclear phagocyte system resulted in a reduction in the activity of the bone marrow erythroid cell proliferation in unaltered erythropoietin production in response to hypoxic hypoxia. It is suggested that the local bone marrow macrophagal cells produce one or more erythropoiesis-stimulating substances. N B

A83-19922

**THE EFFECT OF ADRENALECTOMY AND HYDROCORTISONE ON THE CARBOHYDRATE METABOLISM IN THE LUNGS AND MYOCARDIUM DURING CHRONIC HYPOXIA [VLIANIE ADRENALEKTOMII I GIDROKORTIZONA NA UGLEVOVNYI OBMEN V LEGKIKH I MIKARDE PRI KHRONICHESKOI GIPOKSII]**  
N N PRIBILOVA (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, Nov-Dec 1982, p 65-68 In Russian refs

The changes in the content of glucose, glycogen, pyruvate, lactate, hexokinase, and lactate dehydrogenase were studied in the heart and lung tissues of white male mice after bilateral adrenalectomy followed by 7 and 35 day exposures to hypoxic



conditions and hydrocortisone injections. Results show that the level of glucose and glycogen drops sharply after bilateral adrenalectomy, while the activity of hexokinase increases. A significant reduction in the principal carbohydrates in the lungs and myocardium was observed following exposure of the adrenalectomized animals to hypoxic conditions for 7 and 35 days, which predisposed the animals to a lowered resistance to hypoxia. However, injections of hydrocortisone were found to have a positive effect on the carbohydrate metabolism in the lungs and myocardium of the animals during hypoxia. N B

#### A83-19923

#### THE ENERGY METABOLISM IN THE BRAINS OF RATS EXPOSED TO MECHANICAL ASPHYXIA [ENERGETICHESKII OBMEN V GOLOVNOY MOZGE KRYS, PERENESSHIKH MEKHANICHESKUIU ASFIKSIIU]

V D KONVAL (Omskii Meditsinskii Institut, Omsk, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, Nov-Dec 1982, p 78-81. In Russian. refs

The level of free mononucleotides, the rate of glycolysis in the brain, and the concentrations of glucose, lactate, and urate in the blood were studied in rats during a 6.5 minute period of mechanical asphyxia and in the postresuscitation period. Results show that during the beginning of asphyxia the content of the adenine energetic compounds in the tissues decreases due to AMP deamination, while later in asphyxia the decrease in these compounds is due to the 5'-nucleotidase reaction. These changes begin to be corrected in the first minutes of the resuscitation period, which prevents the development of hyperlactatemia as a consequence of the delayed utilization of lactic acid by the cells. By the sixth hour of the postresuscitation period, the level of free nucleotides is restored. N B

#### A83-19926

#### SENSORY SYSTEMS: HEARING [SENSORNYE SISTEMY: SLUKH]

G V GERSHUNI, (ED) Leningrad, Izdatel'stvo Nauka, 1982. 201 p. In Russian.

Experimental and theoretical studies concerning various topics of the physiology and biophysics of hearing are presented. Several functional models of the activity of the peripheral sections of the hearing system are examined, which include investigations of the evoked potentials in humans. Data concerning the evolutionary and the comparative physiological aspects of the hearing system are presented, as well as reviews which characterize the morphological and functional organization of spatial hearing. N B

#### A83-19927

#### MATHEMATICAL MODELS OF THE HYDRODYNAMICS OF THE COCHLEA OF THE INNER EAR [MATEMATICHESKIE MODELI GIDRODINAMIKI ULITKI VNUTRENNEGO UKHA]

V S SHUPLIAKOV (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In Sensory systems Hearing. Leningrad, Izdatel'stvo Nauka, 1982, p 3-17. In Russian. refs

Various hypotheses concerning the formation of frequency-selection curves on the periphery of hearing are compared. The probable sources of the nonlinearity and their role in the process of forming frequency selectivity are analyzed. A review of current models of the hydrodynamics of the cochlea is presented. It is shown that these models do not satisfy the conditions presented by the peripheral part of the auditory analyzer and that these models must be supplemented by a 'second filter'. The properties of the 'second filter,' which are derived from experiments with animals, are examined and the correspondence of the supplemented models to the experimental data is evaluated. N B

#### A83-19928

#### MATHEMATICAL MODELS OF THE PROCESS OF SIGNAL CONVERSION ON THE PERIPHERY OF THE AUDITORY SYSTEM /STATUS AND PROSPECTS OF APPLICATION/ [MATEMATICHESKIE MODELI PROTSESSA PEROBRAZOVANIYA SIGNALOV NA PERIFERII SLUKHOVOI SISTEMY /SOSTOYANIE I PERSPEKTIVY ISPOL'ZOVANIYA/]

L N BABKINA, A P MOLCHANOV, and T I TERESHCHUK (Nauchno-Issledovatel'skii Institut po Bolezniam Ukh, Gorla, Nosa i Rechi, Leningrad, USSR) In Sensory systems Hearing. Leningrad, Izdatel'stvo Nauka, 1982, p 18-32. In Russian. refs

Several models of the peripheral part of the auditory system are analyzed, and a structure for the excitation mechanism of the receptor cells in the organ of Corti is developed. It is proposed that linear and nonlinear components are included in the excitation effect on the receptors, which are evoked according to microphony and summed potentials. The calculated characteristics of the proposed model are determined to correspond closely to experimental data. N B

#### A83-19930

#### CORRELATION METHODS OF THE ANALYSIS OF THE REACTION OF INDIVIDUAL NEURONS OF THE AUDITORY SYSTEM. I - THE CORRELATION OF AN AUDITORY SIGNAL WITH IMPULSE ACTIVITY [KORRELIATSIONNYE METODY ANALIZA REAKTSII ODINOCHNYKH NEIRONOV SLUKHOVOI SISTEMY. I - KORRELIATSIYA ZVUKOVOGO SIGNALA S IMPUL'SNOI AKTIVNOST'YU]

N G BIBIKOV (Akademiya Nauk SSSR, Akusticheskii Institut, Moscow, USSR) In Sensory systems Hearing. Leningrad, Izdatel'stvo Nauka, 1982, p 58-72. In Russian. refs

#### A83-19931

#### NEUROPHYSIOLOGICAL MANIFESTATIONS OF MONAURAL PHASE SENSITIVITY OF THE AUDITORY SYSTEM [NEIROFIZIOLOGICHESKIE PROIAVLENIYA MONAURAL'NOI FAZOVOI CHUVSTVITEL'NOSTI SLUKHOVOI SISTEMY]

E A RADIONOVA (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In Sensory systems Hearing. Leningrad, Izdatel'stvo Nauka, 1982, p 72-86. In Russian. refs

#### A83-19933

#### THE EVOLUTION OF THE STRUCTURAL-FUNCTIONAL ORGANIZATION OF THE ORGAN OF HEARING OF VERTEBRATES [EVOLIUTSIYA STRUKTURNO-FUNKTSIONAL'NOI ORGANIZATSII ORGANA SLUKHA POZVONOCHNYKH]

IA A VINNIKOV (Akademiya Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) In Sensory systems Hearing. Leningrad, Izdatel'stvo Nauka, 1982, p 122-133. In Russian. refs

A review is presented of studies concerning the evolution of the organ of hearing in vertebrates, which developed through the secondary sensory hair cells. These cells were inherited as an organ of hearing from organs of the lateral line and of the receptor of gravitation. It is shown that the perception of sound frequencies is connected with the change in the function of the hair cell receptors. This occurred simultaneously with an adequate increase in the biophysical complexity of the structure of the middle and inner ear, which act to transform the sound radiation. N B

#### A83-19934

#### THE ROLE OF THE SECTIONS OF THE HEARING SYSTEM IN THE LOCALIZATION OF THE SOURCE OF SOUND [ROL' OTDELOV SLUKHOVOI SISTEMY V LOKALIZATSII ISTOCHNIKA ZVUKA]

A V BARU and I V KALMYKOVA (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In Sensory systems Hearing. Leningrad, Izdatel'stvo Nauka, 1982, p 170-189. In Russian. refs

The threshold characteristics of the localization of the source of sound in a horizontal plane (and its lateralization) are studied for a series of mammals. The disruptions of the localization and

lateralization functions which occur during the experimental surgical destruction of various centers of the hearing system of animals and during the severing of the fibers of the ascending auditory pathway are investigated. The role of the sections of the hearing system in the organization of spatial hearing is examined based on data from behavioral, electrophysiological, and morphological studies N B

#### A83-19935

#### A CYTOCHEMICAL INVESTIGATION OF THE HEARING SYSTEM DURING ACOUSTIC STIMULATION [TSITOKHIMICHESKOE ISSLEDOVANIIE SLUKHOVOI SISTEMY PRI ZVUKOVOM RAZDRAZHENII]

G. N. SHMIGIDINA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In Sensory systems Hearing Leningrad, Izdatel'stvo Nauka, 1982, p 189-198 In Russian refs

The peculiarities of the structure of the neural sections of the hearing system are examined, based on studies which utilize the cytophotometric method for evaluating the concentration of RNA in cells. This method provides a sufficiently accurate quantitative evaluation of the RNA concentration at rest and after the application of functional loads. Data about the bilateral convergence of the afferentation at the level of the superior olivary body and the rear hillock are evaluated, and future applications of this method are discussed N B

#### A83-20241

#### THE EFFECT OF SMALL DOSES OF ETHANOL ON THE MINUTE WAVES OF ULTRALOW ACTIVITY AND THE TEMPERATURE OF THE BRAIN [VLIANIE MALYKH DOZ ETANOLA NA MINUTNYE VOLNY SVERKHMEDLENNOI AKTIVNOSTI I TEMPERATURY GOLOVNOGO MOZGA]

IU S. BORODKIN, I A. LAPINA, and I K. IAICHNIKOV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 68, Nov 1982, p 1472-1477 In Russian refs

The multiminute waves of ultraslow activity in the range of 0.1 Hz and the temperature of the brain were measured following the introduction of ethanol in rabbits having gold electrodes implanted into their brain structures and thermocouples in their dorsal hippocampus. The ethanol was injected rectally in doses of 0.25, 0.5, 0.75, 1.0, 1.25, and 1.5 g/kg body weight. The first changes of amplitude and frequency of oscillation were detected locally in the moving neocortex during doses of 0.5 g/kg body weight. The frequency spectrum of the minute oscillations was decreased everywhere from 0.8-0.2 Hz upon the injection of ethanol in doses 1.25 and 1.5 g/kg body weight and abolished the wide range of individual thalamic nuclei responses. The same doses of ethanol injected following the administration of ethmisol (1.5 mg/kg body weight) had a weaker effect on the frequency-amplitude characteristics of minute waves. After stabilizing the initial functional state, ethmisol interfered with the decrease in the metabolism level of the neuro-glial populations of the brain structures N B

#### A83-20242

#### THE HORMONAL DEPENDENCE OF THE INITIAL STAGES OF HEPARIN CLEARANCE DURING IMMOBILIZATION STRESS IN RATS [GORMONAL'NAIA OBUSLOVLENNOST' NACHAL'NYKH ETAPOV KLIRENSA GEPARINA PRI IMMOBILIZATSIONNOM STRESSE UKRYS]

B. A. KUDRIASHOV, F. B. SHAPIRO, and A. M. ULIANOV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Fiziologicheskii Zhurnal SSSR, vol 68, Nov 1982, p 1531-1536 In Russian refs

#### A83-20243

#### THE CHANGES IN THE ACTIVITY OF THE INTRACARDIAC GANGLIONIC-SYNAPTIC APPARATUS DURING THE INTERACTION OF SYMPATHETIC AND PARASYMPATHETIC REGULATORY EFFECTS ON THE RHYTHM OF THE PACEMAKER [IZMENENIE AKTIVNOSTI VNUTRISVEDECHNOGO GANGLIOZNO-SINAPTICHESKOGO APPARATA PRI VZAIMODEISTVII SIMPATICHESKIKH I PARASYMPATICHESKIKH REGULIATORNYKH VLIANII NA RITM PEISMEKERA]

N. A. SOKOLOVA, G. N. KOPYLOVA, E. A. PAVLENKO, M. A. KAVERIN, and M. G. UDELNOV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Fiziologicheskii Zhurnal SSSR, vol 68, Nov 1982, p 1537-1543 In Russian refs

#### A83-20244

#### THE BLOOD SUPPLY AND OXYGEN CONSUMPTION IN THE GASTROCNEMIUS MUSCLE OF CATS DURING ISOMETRIC TETANUS UNDER CONDITIONS OF INTRAARTERIAL INFUSIONS OF NORADRENALINE [KROVOSNABZHENIE I POTREBLENIE KISLORODA IKRONOZHNOI MYSHTSEI KOSHKI PRI IZOMETRICHESKOM TETANUSE V USLOVIAKH VNUTRIARTERIAL'NOI INFUZII NORADRENALINA]

V. A. LEVTOV, N. IA. SHUSTOVA, L. I. VASILEVA, and V. N. SHUVAEVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 68, Nov 1982, p 1544-1552 In Russian refs

#### A83-20245

#### THE ADRENOREACTIVITY OF THE VESSELS OF THE SMALL INTESTINE IN CATS DURING THE PROCESS OF HIGH ALTITUDE ADAPTATION [ADRENOREAKTIVNOST' SOSUDOV TONKOGO KISHECHNIKA U KOSHEK V PROTSESSE VYSOKOGORNOI ADAPTATSII]

S. A. POLENOV, G. V. CHERNIAVSKAIA, K. IU. AKHMEDOV, A. A. NURMATOV, and V. G. BOEHKOVA (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR, Tadzhikskii Meditsinskii Institut, Dushanbe, Tadzhik SSR) Fiziologicheskii Zhurnal SSSR, vol 68, Nov 1982, p 1560-1568 In Russian refs

The changes in the resistance and capacitance of the small intestine vessels to adrenergic stimulation were studied in acute experiments in cats following 3-30 days of high altitude adaptation in the Pamir mountains (3370 m). In comparison with the control animals (at Dushanbe, 830 m), the experimental animals showed increased constrictor reactions of the arterial vessels to intraarterial injections of noradrenaline and adrenaline, while the vasodilator responses to the injection of novodrine decreased. The changes in the outflow of venous blood from the small intestine in response to catecholamines were greater at high altitudes than at lower altitudes. Pharmacological analysis indicates that the reactivity of the alpha-adrenoreceptors of the arterial and venous vessels of the small intestine increased, while the reactivity of the beta-adrenoreceptors of the arterial vessels decreased during the adaptation to high altitude conditions. The greatest changes of the adrenoreactivity were detected after 3-5 days and 14-16 days of adaptation N B

#### A83-20246

#### THE EFFECT OF A HIGH-PRESSURE GASEOUS ENVIRONMENT ON THE CONTENT OF SODIUM, POTASSIUM, AND WATER IN THE BLOOD AND TISSUES OF WHITE RATS [VLIANIE POVYSHENNOGO DAVLENIIA GAZOVOI SREDY NA SODERZHANIE NATRIIA, KALIIA I VODY V KROVI I TKANIAKH BELOI KRYSY]

IU. IA. KISLIAKOV, V. G. LEONTEV, and M. M. SOKOLOVA (Akademiia Nauk SSSR, Institut Fiziologii i Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 68, Nov 1982, p 1569-1572 In Russian refs

## 51 LIFE SCIENCES (GENERAL)

**A83-20351**

**SENSORY SYSTEMS: VISION [SENSORNYE SISTEMY: ZRENIE]**

G V GERSHUNI, (ED) Leningrad, Izdatel'stvo Nauka, 1982 212 p In Russian

Experimental studies and reviews of various problems concerning the physiology of vision are presented. Topics examined include the processing of visual information in the retina and the central regions of the visual system in animals of various levels of evolutionary development and in humans, the problems of the visual-spatial orientation and color perception, and the morphology and function of the retina. Also considered are the mechanisms of eye fixation. N B

**A83-20352**

**THE NEURONAL RECEPTIVE FIELDS OF THE VISUAL CORTEX OF CATS DURING CHANGES IN THE LEVEL OF WAKEFULNESS [RETSEPTIVNYE POLIA NEIRONOV ZRITEL'NOI KORY KOSHKI PRI IZMENENII UROVNIA BODRSTVOVANIIA]**

N N VERDEREVSKAIA and I A SHEVELEV (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 41-53 In Russian refs

**A83-20353**

**THE VISUAL FUNCTION OF THE NONPROJECTED SECTIONS OF THE CORTEX AND ITS REFLECTION IN THE EVOKED POTENTIALS [ZRITEL'NAIA FUNKTSIIA NEPROEKTSIONNYKH OTDELOV KORY I EE OTRAZHENIE V VYZVANNYKH POTENTIALAKH]**

D A FARBER, T G BETELEVA, A S GOREV, and E I SAVCHENKO (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 53-64 In Russian refs

Results are presented of an electrophysiological analysis of the mechanisms of visual perception. The structure of the evoked potentials of various regions of the cortex is examined, as well as the reflection in their characteristics of operations such as the isolation of contrast boundaries, reactions to complex images, and identification. It is established in ontogenetic investigations that the sensory analysis progressively draws in the associative regions of the cortex. The effect of these regions on the projected cortex are studied. N B

**A83-20356**

**THE ROLE OF VARIOUS CORTICAL REGIONS IN VISUAL-MOTOR COORDINATION [ROL' RAZLICHNYKH KORTIKAL'NYKH OBLASTI V ZRITEL'NO-MOTORNOI KOORDINATSII]**

A S BATUEV, L V CHERENKOVA, G A KULIKOV, and I U A IUNATOV (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 101-113 In Russian refs

A review is presented of studies concerning the organization of the visual entrance to the frontal and parietal regions of the cerebral cortex. The changes in the ability of cats to perform a series of tasks of visually controlled behavior following damage to the occipital, parietal, and frontal regions of the cortex are examined. The results obtained in experiments utilizing lesions of the projection and associative cortical zones are compared. Several proposals are presented about the mechanisms for the inclusion of the associative regions of the cortex in the organization of visually controlled behavior of animals. N B

**A83-20360**

**THE COEFFICIENT OF CAPILLARY FILTRATION IN THE SKELETAL MUSCLES DURING CHANGES IN THEIR HEMODYNAMICS [KOEFFITSIENT KAPILLIARNOI FIL'TRATSII V SKELETNYKH MYSHTSAKH PRI IZMENENII V NIKH GEMODINAMIKI]**

B I TKACHENKO, D P DVORETSKII, I U A KUDRIASHOV, A K SAVELEV, V A DEMIDOV, and G F SULTANOV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 68, Dec 1982, p 1666-1672 In Russian refs

The functional dependence of the coefficient of capillary filtration in the skeletal muscles of cats on the changes in their arterial and venous pressures was investigated, and the volume speed of blood flow was determined, in order to study the effect of these hemodynamic parameters on the capillary filtration coefficient of the capillary bed. Results show that the capillary filtration coefficient in the skeletal muscles did not depend on induced changes of arterial pressure (in the range of 65-280 mm Hg), venous pressure (in the range of 0-30 mm Hg), and blood inflow (in the range of 75-150% of the initial level). A negative functional relationship was found between the blood flow and the capillary filtration coefficient in the skeletal muscles if the blood flow was less than 75% of the normal level. It is concluded that these results indicate a metabolic dilation of the precapillary sphincters due to a limitation of the blood supply in the skeletal tissues. N B

**A83-20361**

**THE PERIPHERAL AND CENTRAL EFFECTS OF GAMMA-AMINOBUTYRIC ACID ON THE VASCULAR THERMOREGULATORY REACTION IN RABBITS [PERIFERICHESKOE I TSENTRAL'NOE VLIANIE GAMMA-AMINOMASLIANOI KISLOTY NA SOSUDISTUII TERMOREGULIATORNUIU REAKTSIIU U KROLIKOV]**

R A ARUTIUNIAN (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR) Fiziologicheskii Zhurnal SSSR, vol 68, Dec 1982, p 1693-1698 In Russian refs

**A83-20362**

**THE EFFECT OF PROSTAGLANDIN F2-ALPHA ON THE THERMOREGULATIVE PECULIARITIES IN RABBITS [VLIANIE PROSTAGLANDINA F2-ALPHA NA TERMOREGULIATSIONNYE OSOBENNOSTI U KROLIKOV]**

S K KARAPETIAN and R A ARUTIUNIAN (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR) Fiziologicheskii Zhurnal SSSR, vol 68, Dec 1982, p 1699-1703 In Russian refs

**A83-20385**

**VISUAL PATHWAYS AND THE SYSTEM OF BRAIN ACTIVATION [ZRITEL'NYE PUTI I SISTEMA AKTIVATSII MOZGA]**

I U G KRATIN, N A ZUBKOVA, V V LAVROV, T S SOTNICHENKO, and K P FEDOROVA Leningrad, Izdatel'stvo Nauka, 1982 156 p In Russian refs

The neurophysiological mechanisms of the higher functions of the brain are studied, in particular the activity of the integrating and analyzing system, which combines the associative sections of the specialized analyzers, the activation apparatus, memory, and the output units of effector control. Attention is focused on the principle of the mutual dependence of the analytic function with the activation process of the central nervous system. The projections of the visual system in the specific and nonspecific formations of the brain are investigated, and the significance of the various levels of the activation apparatus and the pathways for the distribution of the activating effects is evaluated. The significance of the visual projections in the cortex and their significance in the nonspecific truncal sections of the brain are compared for their analytical activity. The leading role of the cortex in the mechanism of analyzing signals, in processing information, and in controlling the activation of the brain is examined. Conceptions of the integrating and analyzing system as a higher system which provides for the adequate relationship of an organism with the environment are discussed. N B



A83-20777

**THE EFFECTS OF VARIOUS GASES ON CORTICAL AND SPINAL SOMATOSENSORY EVOKED POTENTIALS AT PRESSURES UP TO 10 BAR**

D R LEITCH, J M HALLENBECK, and L J GREENBAUM, JR (U S. National Naval Medical Center, Naval Medical Research Institute, Bethesda, MD) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 105-111 refs

The development of dog electrophysiological models for studying the treatment of cerebral arterial air embolism and spinal cord decompression sickness, required that the effects of the treatment gases on spinal and cortical somatosensory evoked potentials (SEP and CEP) be known. An inverse linear relationship was found between CEP amplitude and air pressure to 230 ft. An asymptote was approached when pressure was increased to 300 ft. This effect was not seen with 20% oxy-helium. The waves representing local cord events were depressed to a lesser extent than were the CEPs. An equilibration time in the EP suppression comparable to estimated inert gas wash-in time for the brain was detected. A small depression of CEPs that did not reach significance was seen with exposure to 2.8 bar of oxygen and continuous exposure for up to 120 min caused no further diminution in amplitude than would be caused by time alone. (Author)

A83-20781

**EVIDENCE OF GENETIC DIFFERENCES IN ACUTE HYPOXIA SURVIVAL**

A PERRAMON, M STUPFEL, P MERAT, V H DEMARIA PESCE, V GOURLET, and H THIERRY (Institut National de la Sante et de la Recherche Medicale, Le Vesinet, Institut National de la Recherche Agronomique, Jouy-en-Josas, Yvelines, France) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 127-131 refs

In a population of Japanese quail, a genetic selection was performed leading to two strains - one resistant and one susceptible to an acute hypoxic nitrogen challenge as well as to an acute carbon monoxide intoxication. Crossing these two strains gives an F1 hybrid whose survival to acute hypoxia appears to be very close to the susceptible strain. The difference in acute hypoxic survival already appears in embryos at the age of 12 d. Susceptibility to acute hypoxia seems to be a dominant character. (Author)

A83-20843

**INVESTIGATION OF CAMP PHOSPHODIESTERASE ACTIVITY IN BRAIN TISSUE UNDER GENERAL AND LOCAL IRRADIATION OF THE HEAD AND BODY OF ADULT ANIMALS AND EMBRYOS [IZUCHENIE TSAMF FOSFODIESTERAZNOI AKTIVNOSTI V MOZGOVOI TKANI PRI OBSHCHEM I LOKAL'NOM OBLUCHENII GOLOVI I TULOVISHCA VZROSLYKH ZHIVOTNYKH I EMBRIONOV]**

G K GOKSADZE (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol 107, Sept 1982, p 593-596 In Russian refs

A83-20844

**DEGRADATION OF THE PHOSPHOLIPIDS OF THE OUTER AND INNER MEMBRANES OF MITOCHONDRIA UNDER EXPOSURE TO LOW TEMPERATURE [DEGRADATSIIA FOSFOLIPIDOV VNESHNIKH I VNUTRENNIKH MEMBRAN MITOKHONDRII PRI NIZKOTEMPERATURNOM VOZDEISTVII]**

A G. CHOGOSHVILI (Tbilisskii Gosudarstvennyi Universitet, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol 107, Sept. 1982, p 597-600 In Russian refs

A83-20845

**THE EFFECT OF PHYSICAL EXERCISE ON THE ULTRASTRUCTURE OF THE DAMAGED MYOCARDIUM [VLIANIE FIZICHESKIKH NAGRUZOK NA UL'TRASTRUKTURU POVREZHDENNOGO MIOKARDA]**

L SH KARKARASHVILI (Akademiia Nauk Gruzinskoi SSR, Institut Eksperimental'noi Morfologii, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol 107, Sept 1982, p 605-608 In Russian

The ultrastructure of the heart damaged as a result of various frequent and intense physical exercises was studied in rats. Heart damage was caused by a double injection of novodrin at a dose of 75-80 mg/kg. Electron microscopy shows that a single instance of acute physical exercise increases the pathological changes caused by the novodrin injection and increases the permeability of the vessel wall. But moderate physical exercise (swimming for 2 hours twice a week for 15 months) stimulates the compensatory-adaptive mechanism in the capillary wall and myocytes. B J

A83-20966

**A KINETIC MODEL OF THE ELECTRON AND CONFORMATIONAL TRANSITIONS IN THE PHOTOSYNTHETIC REACTION CENTERS OF PURPLE BACTERIA [KINETICHESKAIA MODEL' ELEKTRONNYKH I KONFORMATSIONNYKH PEREKHODOV V FOTOSINTETICHESKIKH REAKTSIONNYKH TSENTRAKH PURPURNYKH BAKTERII]**

E G PETROV, V N KHARKIANEN, P P NOKS, A A KONONENKO, and A B RUBIN (Akademiia Nauk Ukrainskoi SSR, Institut Teoreticheskoi Fiziki, Kiev, Ukrainian SSR, Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Akademiia Nauk SSSR, Izvestiia, Seria Biologicheskaiia, Jan-Feb 1983, p 28-43 In Russian refs

A83-20967

**THE EFFECT OF PHOTOTROPISM AND CHEMOTROPISM IN THE ABSENCE OF GEOTROPISM ON THE ORIENTATION OF HIGHER PLANTS [VLIANIE FOTO- I KHEMOTROPIZMA V OTSUTSTVIE GEOTROPIZMA NA ORIENTATSIU VYSSHIKH RASTENII]**

P N PLATONOVA, V IU LIUBCHENKO, A V DEVIATKO, G I MALYSHEVA, S A PANOVA, A L MASHINSKII, N M TIKHONRAVOVA, and G S NECHITAIILO (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Akademiia Nauk SSSR, Izvestiia, Seria Biologicheskaiia, Jan-Feb 1983, p 51-59 In Russian refs

The possibility of using phototropism or chemotropism in order to compensate for the absence of geotropism in the absence of gravity was investigated using peas, wheat, and several other higher plants. Results show that the orientation of the seedlings, germinated under weightless conditions, depends on the shape of the germ and its location in the seed in relation to the surface of the substrate. It was found that the absence of geotropism during weightless conditions is partially compensated by light, but is not compensated by the presence of nutrients in the substrate. N B

A83-20968

**THE EFFECT OF A MAGNETIC FIELD ON THE PATTERNS OF THE FREQUENCY CHANGES AND THE CONTENT OF SEROTONIN IN THE ISOLATED HEART OF FROGS [VLIANIE MAGNITNOGO POLIA NA DINAMIKU IZMENENIIA CHASTOTY I SODERZHANIE SEROTONINA IZOLIROVANNOGO SERDTSIA LIAGUSHKI]**

V M ARISTARKHOV, I V SINEVA, and L M MERKULOVA (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, Chuvashskii Gosudarstvennyi Universitet, Cheboksary, USSR) Akademiia Nauk SSSR, Izvestiia, Seria Biologicheskaiia, Jan-Feb 1983, p 111-121 In Russian refs

A83-20976

AN AUTORADIOGRAPHIC INVESTIGATION OF PROTEIN SYNTHESIS BY THE MUSCLES AND INTERSTITIAL ELEMENTS OF THE MYOCARDIUM DURING THE FORMATION OF COMPENSATORY HYPERFUNCTION OF THE HEART [AVTORADIOGRAFIKESKOE ISSLEDOVANIE BELKOVOGO SINTEZA MYSHECHNYKH I INTERSTITSIAL'NYKH ELEMENTOV MIOKARDA V PROTSESSE FORMIROVANIYA KOMPENSATORNOI GIPERFUNKTSII SERDTSA]

T V PISTSOVA and I A CHERVOVA (II Moskovskii Meditsinskii Institut, Moscow, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 105-107 In Russian refs

A83-20977

THE RESPONSE OF THE SURFACTANT SYSTEM AND THE AIR-BLOOD BARRIER OF THE LUNGS TO OVERALL ACUTE HYPOTHERMIA [REAKTSIYA SURFAKTANTNOI SISTEMY I VOZDUSHNO-KROVIANOGO BAR'ERA LEGKIKH NA OBSHCHEIU OSTRUU GIPOTERMIIU]

L K ROMANOVA and M S POKROVSKAYA (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 97-102 In Russian refs

Male rats weighing 235-350 g are subjected to cooling at a temperature of -20 C for 4-6 hours. Interstitial and intraalveolar edema is found to develop in the lungs, together with atelectases and local hemorrhages. It is shown that overall acute hypothermia causes a local impairment of the air-blood barrier as a result of hydropic dystrophy and degeneration of type I alveolocytes and endotheliocytes. Another result is disintegration, aggregation, and membrane lysis of the alveolar surfactant. The surface active material is found to accumulate in the interstices of the interalveolar septa, this derives from the elimination of disintegrated surfactant by type I alveolocytes and from phospholipid secretion from the basal side of type II alveolocytes. An increase in the functional activity of type II alveolocytes and alveolar macrophages is also observed.

C R

A83-20978

THE FUNCTIONAL MORPHOLOGY OF THE SUBMAXILLARY SALIVARY GLANDS OF RATS DURING AGE-RELATED DISORDERS OF ENDOCRINE REGULATION [FUNKTSIONAL'NAYA MORFOLOGIYA PODCHELIUSTNYKH SLIUNNYKH ZHELEZ KRYA PRI VOZRASTNYKH NARUYENIYAKH ENDOKRINNOI REGULATSII]

M G RYBAKOVA (I Leningradskii Meditsinskii Institut, Leningrad, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 92-95 In Russian refs

A83-20979

THE CHARACTERISTICS OF THE MECHANISM OF ACTION OF CYPROHEPTADINE /PERITOL/ ON THE ACTIVITY OF THE HYPOTHALAMO-HYPOPHYSIAL-ADRENAL SYSTEM [OSOBENOSTI MEKHANIZMA DEISTVIA TSIPROHEPTADINA /PERITOLA/ NA AKTIVNOST' GIPOTALAMO-GIPOFIZARNO-ADRENALOVOI SISTEMY]

V N SLAVNOV, G V VALUEVA, and E V LUCHITSKII (Ministerstvo Zdravookhraneniya Ukrainy SSR, Kievskii Nauchno-Issledovatel'skii Institut Endokrinologii i Obmena Veshchestv, Kiev, Ukrainian SSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 71-73 In Russian refs

The dependence of the antiserotonin effect on the dosage and the frequency of the administration of pentol is investigated, and the mechanism of the action of this drug on the hypothalamo-hypophyseal-adrenal system is studied. It is found in studies on male rats that the serotonin inhibiting effect of pentol depends to a significantly greater extent on the frequency of its administration than on the dosage. In addition, it is shown that the antiserotonin effect of pentol is carried out through the central nervous system and that this drug acts on several regulatory mechanisms in peripheral tissues, such as the adenylate cyclase system and the secretion of corticosterone.

N B

A83-20980

THE CONTENT OF UBIQUINONE AND VITAMIN E IN RAT TISSUES DURING EXPERIMENTAL FOCAL MYOCARDITIS AND HYPOXIC HYPOXIA [SODERZHANIE UBIKHINONA I VITAMINA E V TKANIAKH KRYA PRI EKSPERIMENTAL'NOM OCHAGOVOM MIOKARDITE I GIPOKSICHESKOI GIPOKSII]

G V DONCHENKO, I V KUZMENKO, E V KOLIADENKO, and R V CHAGOVETS (Akademiya Nauk Ukrainy SSR, Institut Biokhimi, Kiev, Ukrainian SSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 36-38 In Russian refs

The content of ubiquinone and vitamin E in various tissues of rats is studied during acute hypoxic hypoxia and hypoxia of a histotoxic character (focal myocarditis) which is induced by the injection of adrenalin. Results show that the content of these two compounds in the liver, heart, kidney, and muscle tissues during focal myocarditis varies from the content found during hypoxic hypoxia. It is determined that these compounds accumulate in the mitochondria of the myocardium, which is considered to be of importance in the compensatory and adaptation reactions of the animals. It is concluded that both ubiquinone and vitamin E contribute to increasing the resistance of the body to hypoxic exposure.

N B

A83-20981

THE EFFECT OF THE CALMODULIN INHIBITOR, TRIFLUOROPERAZINE, ON THE CALCIUM ACTIVATION OF PHOSPHORYLASES IN THE GLYCOSOMES OF THE SKELETAL MUSCLES IN RABBITS [VLIYANIE INHIBITORA KAL'MODULINA - TRIFTORPERAZINA - NA KAL'TSIEVUIU AKTIVATSIIU FOSFORILAZY V GLIKOSOMAKH SKELETNYKH MYSHTS KROLIKA]

N P LARIONOV and I A FEOKTISTOV (Akademiya Meditsinskikh Nauk SSSR, Tomsk, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 35, 36 In Russian refs

A83-20982

THE EFFECT OF HYPOTHERMIA ON THE GLUTAMATE DEHYDROGENASE ACTIVITY IN THE BRAIN [VLIYANIE GIPOTERMII NA GLUTAMATDEGIDROGENAZNUIU AKTIVNOST' MOZGA]

D U CHERKESOVA and E Z EMIRBEKOV (Dagestanskii Gosudarstvennyi Universitet, Makhachkala, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Sept 1982, p 33-35 In Russian refs

The activity and the temperature dependence of glutamate dehydrogenase were investigated in the brains of white male rats during moderate (30 C) and deep (20 C) hypothermia. It was found that hypothermia resulted in an increase in the activity of glutamate dehydrogenase at all the incubation test temperatures, although the increase depended on the length and degree of hypothermia. It was determined that the increase in the activity of this enzyme was the greatest for hypothermia at 20 C. It is concluded that the increase in the activity of glutamate dehydrogenase in the brain during hypothermia enables glutamate to carry out synaptic transmissions, which is considered to be an adaptation reaction.

N B

A83-20983

THE EFFECT OF STROPHANTHINE AND CELANIDE ON THE BLOOD CIRCULATION AND METABOLISM IN THE BRAIN [VLIYANIE STROFANTINA I TSELANIDA NA KROVOOBRASHCHENIE I METABOLIZM V GOLOVNOE MOZGE]

CH K TKHAK and M D GAEVYI (Piatigorskii Farmatsevticheskii Institut, Pyatigorsk, USSR) Biulleten' Eksperimental'noi Biologii i Meditsiny, vol 94, Oct 1982, p 66-68 In Russian refs

The effects of strophanthine and celanide, cardiac glycosides, on the dynamics of the blood flow in the brain, the arterial and venous blood pressures, the concentration of oxygen and glucose in the venous and arterial blood of the brain, and the pH of the venous and arterial blood of the brain were studied in cats. Results show that intravenous injections of strophanthine (0.05 mg/kg body

weight) and celanide (0.1 mg/kg body weight) evoked two-phase changes in the cerebral hemodynamics of the animals. At first, the blood flow and arterial pressure of the brain increased regularly, in spite of increases in the resistance of the blood vessels of the brain. Later, the brain blood flow gradually decreased due to a decrease in the arterial pressure, while the resistance of the brain blood vessels decreased and the venous pressure of the brain declined. In addition, the consumption of oxygen and glucose by the cerebral tissues increased. NB

#### A83-20984

**THE EFFECT OF AZAPERONE ON THE DYNAMICS OF THE STRESS-REACTION AND THE CONTENT OF CATECHOLAMINES IN THE ADRENAL GLANDS OF RATS DURING IMMOBILIZATION STRESS [VLIANIE AZAPERONA NA DINAMIKU STRESS-REAKTSII I SODERZHANIE KATEKHOLAMINOV V NADPOCHECHNIKAKH KRYIS PRI IMMOBILIZATSIONNOM STRESSE]**

L. A. MALIKOVA and V. A. AREFOLOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 94, Oct. 1982, p. 63-66. In Russian. refs

The effect of azaperone (haloperidol), a butyrophenone tranquilizer, on the development of the stress reaction was investigated in rats during immobilization stress. The changes of the sympathetic-adrenal system during stress were evaluated by determining the level of catecholamines in the adrenal glands, as well as by studying the ultrastructure of the chromaffin cells in the adrenal glands. Results show that azaperone exhibits a stress-protective effect on the rats, including the prevention of ulcers in the gastric mucosa, the enlargement of the lipid layer in the adrenal cortex, and an increase in the level of catecholamines. The stress-protective effect of the drug wanes during the development of stress and reaches its highest protective effect only at the stage of stress-reaction exhaustion of the animals. NB

#### A83-20985

**THE CONDITION OF THE RESISTIVE VESSELS OF THE EXTREMITIES IN RATS WITH SPONTANEOUS/HEREDITARY/HYPERTENSION [SOSTOIANIE REZISTIVNYKH SOSUDOV KONECHNOSTEI U KRYIS SO SPONTANNOI /NASLEDSTVENNO OBLUSLOVLENNOI/ GIPERTENZIEI]**

V. G. PINELIS, T. P. VAKULINA, A. V. KOZLOV, and KH. M. MARKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 94, Oct. 1982, p. 31-34. In Russian. refs

#### A83-20986

**SEVERAL INDICATORS OF THE EKG AND METABOLIC PROCESSES DURING AN EXPERIMENTAL CORONARY SPASM IN RATS EXPOSED TO CONDITIONS OF HYPOXIA IN COMBINATION WITH HYPERCAPNIA [NEKOTORYE POKAZATELI EKG I METABOLICHESKIKH PROTSESSOV PRI EKSPERIMENTAL'NOM KORONAROSPAZME U KRYIS, TRENIROVANNYKH GIPOKSIEI V SOCHETANII S GIPERKAPNIEI]**

E. E. ZVERKOVA and N. I. MIKHALKINA (Akademiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma-Ata, Kazakh SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 94, Oct. 1982, p. 26-28. In Russian. refs

The effects of 30 day exposures to hypoxic and combined hypoxic-hypercapnic conditions on several EKG and metabolic indicators, such as the interconversion of lactic acid and pyruvate and the activation of lactate dehydrogenase, were compared in rats during experimental pituitary ischemia of the myocardium. Results show that the injection of pituitary led to a lesser accumulation of lactic acid in the rats exposed previously to hypoxic-hypercapnic conditions than in rats previously exposed to hypoxic conditions. The levels of pyruvate and lactate dehydrogenase were found to be significantly higher in the rats previously exposed to hypoxic-hypercapnic conditions than in the rats previously exposed to hypoxic conditions. It is concluded that hypoxic-hypercapnic exposures are more effective for increasing

the resistance to pituitary ischemia due to the more effective rearrangement of the metabolic processes in the myocardium. NB

#### A83-20987

**THE SUBSTANCE 'P' AND THE MICROCIRCULATORY SYSTEM DURING STRESS [VESHCHESTVO 'P' I SISTEMA MIKROTSIRKULIATSII PRI STRESSE]**

M. P. GORIZONTOVA, V. S. SHINKARENKO (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), and A. M. CHERNUKH. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 94, Sept. 1982, p. 15-18. In Russian. refs

The role of the peptide 'P' on the microcirculation of male rats is investigated during 1 and 24 hr periods of immobilization stress. Results show that injections of the peptide 'P' at a concentration of  $7 \times 10^{-8}$  M increased the microcirculatory disorders associated with the immobilization, while antiserum to the peptide 'P' at an activity of 150 ng SP/equivalent normalized the microcirculation. In addition, it was found that the peptide 'P' and the antiserum caused similar disorders of the vascular permeability for colloidal carbon particles. It is concluded that the peptide 'P' participates in the mechanisms of the disorders of the microcirculatory system which occur during stress. NB

#### A83-20988

**THE EFFECT OF SEVERAL DIURETICS ON THE RENAL EXCRETION OF GLYCINE IN DOGS [VLIANIE NEKOTORYKH DIURETIKOV NA VYDELENIE GLITSINA POCHKAMI U SOBAK]**

V. V. VORONTSOV and A. V. ALADYSHEV (Altaiiskii Meditsinskii Institut, Barnaul, USSR). *Farmakologiya i Toksikologiya*, vol. 45, Nov-Dec. 1982, p. 52-54. In Russian. refs

#### A83-20989

**THE ROLE OF THE KIDNEYS IN THE PHARMACOKINETICS OF NOVOCAINAMIDE [ROL' POCHEK V FARMAKOKINETIKE NOVOKAINAMIDA]**

I. A. F. ZVEREV (Altaiiskii Meditsinskii Institut, Barnaul, USSR). *Farmakologiya i Toksikologiya*, vol. 45, Nov-Dec. 1982, p. 50-52. In Russian. refs

Experiments on dogs and rats were conducted in order to study the dynamics of the excretion of novocainamide from the kidneys and to investigate the therapeutic usefulness of this drug. Results show that the clearance of novocainamide from the kidneys is significantly greater than the clearance of inulin, which indicates the renal excretion of novocainamide. It is determined that the rate of the renal transport of novocainamide in dogs is equal to approximately 2.4-3.1 mg/min. NB

#### A83-20990

**THE MORPHOLOGICAL CHARACTERISTICS OF THE MYONS OF THE MASTICATORY MUSCLE OF MAMMALS AND HUMANS [MORFOGISTOKHIMICHESKAIA KHARAKTERISTIKA MIONOV ZHEVATEL'NOI MYSHTSY MLEKOPITAISHCHIKH I CHELOVEKA]**

V. A. SOLOVEV (Kalininskii Meditsinskii Institut, Kalinin, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 83, Oct. 1982, p. 65-71. In Russian. refs

#### A83-20992

**THE CHANGES IN THE VENOUS ENDOTHELIUM AFTER ACUTE HEMODYNAMIC DISORDERS [IZMENENIYA ENDOTELIIA VEN POSLE OSTROGO NARUSHENIIA GEMODINAMIKI]**

A. N. GANSBURGSKI (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR). *Arkhiv Anatomii, Gistologii i Embriologii*, vol. 83, Oct. 1982, p. 53-59. In Russian. refs

**A83-20994**

**MORPHOFUNCTIONAL FEATURES OF THE CARDIAC NEURAL STRUCTURES IN ADAPTING TO PHYSICAL LOADS IN EXPERIMENTS [MORFOFUNKTSIONAL'NYE OSOBENOSTI NERVNYKH STRUKTUR SERDTSA V USLOVIAKH ADAPTATSII K FIZICHESKIM NAGRUZKAM V EKSPERIMENTE]**

K I KULCHITSKII, B A BEREGOVSKII, M P KOVALSKII, O I LISSOVA, V B RASKALEI, and T T KHVOROSTIANAIA (Kievskii Meditsinskii Institut, Akademiia Nauk Ukrainnoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) Arkhiv Anatomii, Gistologii i Embriologii, vol 83, Oct 1982, p 30-35 In Russian refs

The elements of the intramural apparatus in the heart, aorta, and pulmonary trunk of 1- and 3-month old puppies are found to be formed structurally. However, the simplest forms of their organization predominate, particularly in the terminal apparatus. The low mediatory activity of all the components in the intramural neural apparatus in the heart, aorta, and pulmonary trunk reveals their functional immaturity. With dosed physical loading, the intracardial neural apparatus is found to attain its structural and functional maturation more quickly. C R

**A83-21000**

**ANALGESIC INTESTINAL PEPTIDES - NEW AGENTS OF BODILY DEFENSE [ANAL'GETICHESKIE INTESTINAL'NYE PEPTIDY - NOVYE AGENTY ZASHCHITY ORGANIZMA]**

IU I RAFES (Dnepropetrovskii Nauchno-Issledovatel'skii Institut Gastroenterologii, Dnepropetrovsk, Ukrainian SSR) Laboratornoe Delo, no 11, 1982, p 649-653 In Russian refs

Research done since 1973 on the peptide hormones of the digestive tract is surveyed. In discussing their medicinal value, it is pointed out that they have had a therapeutic effect on 91.3% of all patients receiving them and that in 64.6% of the cases the disorder was eliminated entirely. It has been established conclusively that the peptides, first and foremost secretin, have an invigorating, tonic effect when used on intestinal disorders. On the other hand, pancreozymin has a sedative effect. The peptides have been found singularly effective in treating patients with dumping syndrome. C R

**A83-21049\*** National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

**MORPHOLOGICAL EVIDENCE FOR NATURAL POXVIRUS INFECTION IN RATS**

L M KRAFT (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA), E DANTONI DAMELIO, and F E DAMELIO (San Francisco, University, San Francisco, CA) Laboratory Animal Science, vol 32, Dec 1982, p 648-654 refs

Focal inflammatory and desquamating lesions were seen in the nasal mucosa of rats that were flown aboard the Soviet satellite, Cosmos 1129, in 1979 and in the ground based controls. The infection was clinically inapparent. Electron microscopic examination revealed the presence of poxvirus virions in desquamating cells. The specific poxvirus involved could not be identified. The lesions appeared to be similar to those described by others in rats experimentally infected with mousepox (infectious ectromelia) virus by the intranasal route. (Author)

**A83-21050\*** Miami Univ., Coral Gables, Fla

**THE UPDATED EXPERIMENTAL PROTEINOID MODEL**

S W FOX, T NAKASHIMA, A PRZYBYLSKI, and R M SYREN (Miami, University, Coral Gables, FL) International Journal of Quantum Chemistry, Quantum Biology Symposium no 9, 1982, p 195-204 refs (Contract NGR-10-007-008)

The experimental proteinoid model includes new results indicating that polymers sufficiently rich in basic amino acid catalyze the synthesis of peptides from ATP and amino acids and of oligonucleotides from ATP. The need for simulation syntheses of amino acids yielding significant proportions of basic amino acids is now in focus. The modeled simultaneous protocellular synthesis of peptides and polynucleotides is part of a more comprehensive proposal for the origin of the coded genetic mechanism. The finding of membrane and action potentials in proteinoid microspheres,

with or without added lecithin, is reported. The crucial nature of a nonrandom matrix for protocells is developed. (Author)

**A83-21052\*** Molecular Research Inst., Palo Alto, Calif  
**QUANTUM CHEMICAL STUDIES OF A MODEL FOR PEPTIDE BOND FORMATION FORMATION OF FORMAMIDE AND WATER FROM AMMONIA AND FORMIC ACID**

T OIE, G H LOEW (Rockefeller University, Palo Alto, CA), S K BURT (Molecular Research Institute, Palo Alto, CA), J S BINKLEY (Sandia National Laboratory, Livermore, CA), and R D MACELROY (NASA, Ames Research Center, Moffett Field, CA) American Chemical Society, Journal, vol 104, no 23, 1982, p 6169-6174 refs (Contract NCA2-OR-630-001)

**A83-21172**

**VISUALIZATION OF THE ELECTRIC FIELD AROUND A MOVING ANIMAL BY NUMERICAL CALCULATION**

T KOBAYASHI, K SHIMIZU, and G MATSUMOTO (Hokkaido University, Sapporo, Japan) Institute of Electronics and Communication Engineers of Japan, Transactions, Section E (English), vol E65, Oct 1982, p 565-571 refs

An automated technique that visualizes the electric field distribution around a moving animal is presented that makes it possible to evaluate the field on the animal's body surface. The technique derives from the numerical analysis of an electric field using the finite difference method. A mouse moving freely is photographed on 35-mm monochromatic film which is then transformed into a digital image using a flying spot scanner (FSS). This image serves as a boundary condition for the numerical calculation of the electric field. The distributions of equipotential lines and electric lines of force are both plotted on an X-Y plotter. The intensity distribution of the electric field is revealed in the luminance on a CRT display of the FSS and recorded on film. The surface electric field at the animal's body is calculated through extrapolation along the electric line of force and presented in vector patterns. It is shown quantitatively that the electric field on the animal's body varies considerably as the animal changes its posture. C R

**A83-22101**

**THE EFFECT OF A PEPTIDE WHICH INDUCES 'DELTA SLEEP' AND ITS ANALOGUES ON THE ENCEPHALOGRAM OF RABBITS UNDER NORMAL CONDITIONS AND DURING THE DEPRIVATION OF SLEEP AND ITS EFFECT ON LEARNING PROCESSES IN RATS [VLIANIE PEPTIDA, SPOSOBSTVUIUSHCHEGO VOZNIKNOVENIUI 'DELTA-SNA' I EGO ANALOGOVI NA ENTSEFALOGRAMMU KROLIKOV V NORME, PRI DEPRIVATSII SNA I NA PROTSESSY OBUCHENIIA KRYSA]**

V I MEDVEDEV, V D BAKHAREV, A S SARGSIAN, and I I MIKHALEVA (Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 3-10 In Russian refs)

**A83-22102**

**THE INHIBITION CHARACTERISTICS OF THE 1 AND 3 CLASS RECEPTOR FIELDS OF THE RETINA IN FROGS [KHARAKTERISTIKA TORMOZHENIIA V RETSEPTIVNYKH POLIAKH KLASSOV 1 I 3 SETCHATKI LIAGUSHKI]**

V A ZHUKOV (Gor'kovskii Gosudarstvennyi Universitet, Gorki, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 34-40 In Russian refs

The poststimulus histograms of the off-receptors of the 1 and 3 class receptors in the retina of frogs were obtained using moving dark narrow bands of various vertical sizes (1-20 degrees). Results show that the inhibitory action of the periphery of the field increases as the size of the stimulus over the summation zone increases, due to the spatial summation of the inhibitory effects, while stimuli of adequate size evoke a complete inhibition in the receptor fields of both classes. Increasing the size of the moving stimuli, in contrast to the stationary inhibition, not only depresses the reaction, but also increases the latency. The peripheral site which expresses the largest inhibitory effect under stimulation is significantly removed

from the boundaries of the summation zone (by 1.5-2.5 degrees) in the majority of fields. A similar decrease in response in the 1 class fields occurs during the stimulation of a narrower site of the periphery (0.8-2.3 degrees) than in the 3 class fields (2.2-5.7 degrees). It is concluded that the receptor fields in the 1 class have a larger inhibitory zone than the 3 class fields. N.B.

#### A83-22103

**OTOLITHIC NYSTAGMUS IN PIGEONS AFTER UNILATERAL SECTIONING OF THE UTRICULAR NERVES /RAMULI UTRICULI/ [OTOLITOVYI NISTAGM U GOLUBEI POSLE ODNOSTORONNIKH PEREREZOK UTRIKULIARNYKH NERVOV /RAMULI UTRICULI/]**

IU K STOLBKOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 41-45. In Russian refs

It is proposed that stimulation of the otolithic organ leads to the generation of nystagmus only if the stimulation evokes asymmetric changes of the afferent flow from the left and right labyrinth. This proposal is examined for the utricular component of the otolithic organ of the vestibular apparatus. Results of experiments using pigeons with unilateral sectioning of the utricular nerves confirm that nystagmus does occur under these conditions. In addition, it is shown that otolithic nystagmus occurs only when the asymmetry reaches a specific critical level as a result of the stimulation of the otolithic organ. N.B.

#### A83-22104

**THE DYNAMICS OF OXYGEN TRANSPORT FROM THE CAPILLARIES TO THE NERVE CELLS OF THE BRAIN [DINAMIKA TRANSPORTA KISLORODA IZ KAPILLIAROV K NERVNYM KLETKAM KORY MOZGA]**

IU IA KISLIAKOV, M O SAMOILOV, K P IVANOV, and IU I LUCHAKOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 63-69. In Russian refs

A mathematical model is developed to describe the dynamics of oxygen transport in structures with capillaries and pyramidal cells of the sensorimotor cortex of cats. This model calculates the transitional process of oxygen tension in the nerve cells, capillaries, and the surrounding tissues during changes in the speed of the blood flow in the capillaries and in the respiration intensity of the neurons. The model is represented in the form of a system of partial differential equations, whose solution is obtained by the grid method. It is shown that changes of the pO<sub>2</sub> levels in the space of the modeled structures are carried out within 2-5 sec during sharp shifts of the parameters of the model. The delays between the changes of these physiological parameters and the pO<sub>2</sub> levels in the nerve cells depend on the characteristics of the neuron-capillary relationships, the intensity of the demand for oxygen, the speed of the blood flow in the capillaries, and the density of the capillaries. N.B.

#### A83-22105

**THE EFFECT OF PHYSICAL LOADS ON THE LYSOSOME APPARATUS OF NEUTROPHILIC LEUKOCYTES OF THE PERIPHERAL BLOOD [VLIANIE FIZICHESKIKH NAGRUIK NA LIZOSOMAL'NYI APPARAT NEITROFIL'NYKH LEIKOTSITOV PERIFERICHESKOI KROVI]**

S I SHINKAREV (Voroshilovgradskii Gosudarstvennyi Pedagogicheskii Institut, Voroshilovgrad, Ukrainian SSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 70-73. In Russian refs

#### A83-22106

**THE CHANGES OF THE BLOOD FLOW DURING LONGITUDINAL STRAINS OF THE GASTROCNEMIUS MUSCLE IN CATS [OB IZMENENIIAKH KROVOTOKA PRI PRODOL'NYKH RASTIAZHENIIAKH IKRONOZHNOI MYSHTSY KOSHKI]**

A T MATCHANOV, V A LEVTOV, and V V ORLOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 74-83. In Russian refs

#### A83-22107

**AN INVESTIGATION OF THE PARTICIPATION OF THE VENOUS RETURN IN THE PRESSOR CHANGES OF SYSTEMIC HEMODYNAMICS BY MEANS OF THE AUTOMATIC CONTROL OF ITS SIZE [ISSLEDOVANIE UCHASTIIA VENOZNOGO VOZVRATA V PRESSORNYKH IZMENENIIAKH SISTEMNOI GEMODINAMIKI PUTEM AVTOMATICHESKOGO UPRAVLENIIA EGO VELICHINOI]**

A V SAMOILENKO and A IU IUROV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 84-91. In Russian refs

The catecholamine induced pressor changes of arterial pressure were studied in cats using automatic control experiments in order to determine the contribution of the venous return changes. Results show that the changes of the venous return corresponded in the size and pattern of development to the changes observed during the action of catecholamines. It is shown that maximal increases of arterial pressure (by 50%) could be obtained by means of increasing the venous return by 1/6 with adrenaline or by 1/10 with noradrenaline. The maintaining of the increased level of arterial pressure during the maximum increase of venous flow is characterized by a greater participation of these parameters in the systemic shifts. The pressor response can be maintained by an increase in the venous return up to 1/2 with adrenaline and by 1/3 with noradrenaline. The quantitative contribution of the vascular component (total peripheral resistance) to pressor shifts of arterial pressure during the action of catecholamines is greater than that of the cardiac component, especially in response to noradrenaline. N.B.

#### A83-22108

**THE INTERRELATIONSHIP OF THE INTRACRANIAL PRESSURE, THE BLOOD VOLUME OF THE SKULL CAVITY, AND THE TOTAL BLOOD FLOW OF THE BRAIN [O VZAIMOSVIAZI VNUTRICHIEREPNOGO DAVLENIIA, KROVENAPOLNENIIA POLOSTI CHEREPA I SUMMARNOGO MOZGOVOGO KROVOTOKA]**

IU E MOSKALENKO, V A KHILKO, G B VAINSHTEIN, E S NURGUZHAEV, V N SEMERNIA, and B V GAIDAR (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Voennaia Meditsinskaia Akademiia, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 92-99. In Russian refs

#### A83-22109

**THE DISTENSIBILITY OF THE VEINS OF SKELETAL MUSCLES DURING SHIFTS IN THE LEVEL OF HYDROSTATIC VENOUS PRESSURE [RASTIAZHIMOST' VEN SKELETNYKH MYSHTS PRI SDVIGAKH UROVNIA GIDROSTATICHESKOGO VENOZNOGO DAVLENIIA]**

D P DVORETSKII, IU A KUDRIASHOV, G F SULTANOV, and B I TKACHENKO (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 100-105. In Russian refs

It was shown in acute experiments in cats that the integral distensibility of the venous bed of the gastrocnemius skeletal muscle could be graphically represented by a curve with an ascending branch, a peak or small plateau, and a descending branch. These parts of the curve corresponded in most instances to ranges of the venous pressure of (-10)-0 mm Hg, 0-(+10) mm Hg, and (+10)-(+25) mm Hg, respectively. It was found that the neurogenic component of the venous tonus in skeletal muscles does not exert a noticeable effect on the formation of the sizes of the distensibility of the venous vessels in response to hydrostatic loads. However, increasing this tonus by the use of noradrenaline or decreasing the tonus using papaverine induced a corresponding increase or decrease in the distensibilities of the veins. N.B.



A83-22110

THE BLOOD SUPPLY AND THE OXYGEN CONSUMPTION OF THE GASTROCNEMIUS MUSCLES OF CATS DURING ISOMETRIC TETANUS IN CONDITIONS OF A PARTIAL ARTERIAL OCCLUSION [KROVOSNABZHENIE I POTREBLENIE KISLORODA IKRONOZHNOI MYSHTSEI KOSHKI PRI IZOMETRICHESKOM TETANUSE V USLOVIAKH CHASTICHNOI OKKLIUZII ARTERII]

V A LEVTOV, L I VASILEVA, and N IA SHUSTOVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 106-113 In Russian refs

A83-22111

THE RELATIONSHIP BETWEEN ISOMETRIC AND ISOTONIC CONTRACTILE RESPONSES OF THE MYOCARDIUM OF MAMMALS [SOOTNOSHENIE MEZHDU IZOMETRICHESKIM I IZOTONICHESKIM SOKRATITEL'NYMI OTVETAMI MIKARDA MLEKOPITAIUSHEVO]

K IU BOGDANOV, S I ZAKHAROV, and L V ROZENSHTRAUKH (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 114-121 In Russian refs

The contractions of the papillary muscles of guinea pigs in isometric and isotonic work regimes were studied and the changes of these muscles evoked by the action of various inotropic effects, including caffeine, verapamil, variations in stimulation frequency, increases in the  $Ca(2+)$  concentration and cooling, were evaluated. It was found that caffeine and increased  $Ca(2+)$  perfusion slowed down the relaxation phase and increased the response amplitude ratio of the isotonic/isometric contractions by 50-70%. These conditions also led to a delaying of the peak of isotonic contraction after the isometric contraction peak by 50-100 msec. A close correlation was shown between the isotonic/isometric ratio and the delay of the isotonic peak. It is concluded that the delay between the isotonic and isometric peaks and the ratio of their amplitudes depends on the rate of calcium uptake within the myocardial cell. N B

A83-22112

THE OXYGEN TENSION IN THE SKELETAL MUSCLES OF RATS ADAPTED TO COLD [NAPRIAZHENIE KISLORODA V SKELETNYKH MYSHTSAKH U KRYSA, ADAPTIROVANNYKH K KHOLODU]

G P BELOUSOVA (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 122-126 In Russian refs

The oxygen tension ( $pO_2$ ) in the fast (gastrocnemius) and slow (soleus) muscles was measured in unadapted and cold-adapted rats before and after the blocking of the beta-adrenal receptors or the denervation of the muscles. It was found that blocking the beta adrenal receptors decreased the  $pO_2$  in both types of muscles in the control group of rats, while in the cold adapted rats the  $pO_2$  decreased by a smaller amount in the soleus muscle and remained unchanged in the gastrocnemius muscle. Dissection of the sciatic nerve led to a rise of the  $pO_2$  in the muscles of both groups of rats, although this increase was greater for the cold adapted rats than for the unadapted rats. It is concluded that the adaptation of rats to cold changes the regulation of the oxygen balance towards increased oxygen consumption in the muscle tissue at the expense of the stabilization of the  $pO_2$  level. N B

A83-22113

THE FUNCTIONAL CONDITION OF THE MITOCHONDRIA OF THE MUCOUS MEMBRANE OF THE SMALL INTESTINE UNDER THERMAL STRESSES [O FUNKTSIONAL'NOM SOSTOIANII MITOKHONDRII SLIZISTOI OBOLOCHKI TONKOI KISHKI PRI TEPLYKH STRESSAKH]

KH N MUSAIEV, M M RAKHIMOV, K T ALMATOV, and R AKHMEDOV (Tashkentskii Farmatsevticheskii Institut, Tashkent, Uzbek SSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 135-139 In Russian refs

A83-22114

THE ACTIVITY OF AFFERENTS DURING THE EFFECTS OF TEMPERATURE ON THE SKIN OF THE FORELEGS OF CATS [AKTIVNOST' AFFERENTOV PRI TEMPERATURNYKH VOZDEISTVIAKH NA KOZHU PEREDNEI KONECHNOSTI KOSHKI]

I IA KLEINBOK and V L MELNIKOV (Akademiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma Ata, Kazakh SSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 140-145 In Russian refs

A83-22115

THE ROLE OF THE KIDNEYS AND EXTRARENAL MECHANISMS IN THE REGULATION OF THE CONCENTRATION OF SODIUM IN THE BLOOD PLASMA OF RATS DURING THE INTRAVENOUS INJECTION OF A HYPERTONIC SOLUTION OF SODIUM CHLORIDE [ROL' POCHEK I EKSTRARENAL'NYKH MEKHANIZMOV V REGULATSII KONTSENTRATSII NATRIYA V PLAZME KROVI PRI VNUTRIVENNOM VVEDENII GIPERTONICHESKOGO RASTVORA KHLORISTOGO NATRIIA KRYSE]

IU G MONIN and O A GONCHAREVSKAIA (Akademiia Nauk SSSR, Institut Fiziologii i Biokhimii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR, vol 69, Jan 1983, p 146-151 In Russian refs

A83-22117

THE DEGREES OF FREEDOM OF A NEURON AND THE CORTICAL NEURONAL MODULES [STEPENI SVOBODY NEIRONA I KOROVYE NEURONNYYE MODULI]

A S BATUEV and G P DEMIANENKO (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) Uspekhi Fiziologicheskikh Nauk, vol 14, Jan-Mar 1983, p 27-44 In Russian refs

A review of experiments concerning the mechanisms of the formation of intracortical connections is presented, and an evaluation of the degree of the rigidity and plasticity of these connections is given. The main process which determines the formation and retention of similar types of multimodular connections is shown to be intracortical inhibition. An analogy is drawn to between the construction of a cortical neuronal module and the motoneuron projections of the spinal cord. N B

A83-22118

THE SYSTEMIC DETERMINATION OF THE ACTIVITY OF NEURONS IN BEHAVIOR [SISTEMNAIA DETERMINATSIIA AKTIVNOSTI NEIRONOV V POVEDENII]

V B SHVYRKOV (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR) Uspekhi Fiziologicheskikh Nauk, vol 14, Jan-Mar 1983, p 45-66 In Russian refs

Results of experiments on rabbits are presented in which it is determined that a specialization of neurons exists with respect to the specialized functional system of individual innate and acquired acts, as well as hierarchical combinations of these acts into larger systems, and also with respect to concrete goals, movements, and environmental parameters and their combinations. The specialization of neurons relative to goals, movements, and environmental parameters is a consequence of their simultaneous membership in several systems, which share one aspect and are reciprocal in other aspects. It is also shown that the temporal structure of the activity of the neurons reflects the dynamics of the state of the corresponding systems which is determined by the general dynamics of the intersystemic relations. It is concluded that the determination of the activity of neurons in behavior has a psychophysiological character, and that there is a need for a unified psychophysiological theory of behavior. N B.

A83-22119

**THE ROLE OF CATECHOLAMINES IN THE DEVELOPMENT OF SPONTANEOUS ARTERIAL HYPERTENSION IN SPONTANEOUSLY HYPERTENSIVE RATS [ROL' KATEKHOLAMINOV V RAZVITII SPONTANNOI ARTERIAL'NOI GIPERTENSII U KRYIS LINII SHR /SPONTANEOUSLY HYPERTENSIVE RATS/]**

A L MARKEL (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR) Uspekhi Fiziologicheskikh Nauk, vol 14, Jan-Mar 1983, p 67-84 In Russian refs

A83-22120

**SYSTEMIC ANALYSIS OF THE MECHANISMS OF THE REGULATION OF THE AFFINITY OF THE BLOOD FOR OXYGEN. I - INTRAERYTHROCYTIC REGULATION OF THE AFFINITY OF HEMOGLOBIN FOR OXYGEN [SISTEMNYI ANALIZ MEKHAMIZMOV REGULIATSII SRODSTVA KROVI K KISLORODU. I - VNUTRIERITROTSITARNIA REGULIATSIIA SRODSTVA GEMOGLOBINA K KISLORODU]**

M V BORISIUK (Grodzenskii Meditsinskii Institut, Grodno, Belorussian SSR) Uspekhi Fiziologicheskikh Nauk, vol 14, Jan-Mar 1983, p 85-101 In Russian refs

A review is presented of research concerning the main factors involved in the regulation of the oxygen affinity of hemoglobin which act as carriers of information about the oxygen demand of an organism. The significance of the metabolic processes and the condition of the membrane organization of the erythrocytes for the determination of the oxygen-linked properties of the blood are examined. The concentration of free 2, 3-diphosphoglyceric acid, one of the primary products of the metabolism of erythrocytes, is shown to act as a trigger for the allosteric regulation of glycolysis and is a distinctive apparatus for comparing the correspondence of the metabolic level to the functional status of cells. In addition, it is shown that the intraerythrocytic autonomic system for the regulation of the oxygen affinity of hemoglobin, functioning by means of positive biofeedbacks, is not able to provide for the stationary condition of the cell. N B

A83-22689

**FREE-RUNNING ACTIVITY RHYTHMS IN THE RAT - ENTRAINMENT BY MELATONIN**

J REDMAN, S ARMSTRONG, and K T NG (La Trobe University, Bundoora, Victoria, Australia) Science, vol 219, Mar 4, 1983, p 1089-1091 refs

The pineal gland hormone melatonin may play a role in synchronization of rat circadian rhythms. Free-running activity rhythms of the rat were entrained by a daily melatonin injection, with entrainment occurring when the onset of activity coincided with the time of daily injections. When injections were stopped, activity rhythms became free-running again. Thus in pharmacological experiments, the time of day of melatonin administration is crucial. (Author)

A83-22780

**THE ROLE OF PEPTIDE FACTORS IN THE COMPENSATORY PROCESSES IN THE CENTRAL NERVOUS SYSTEM [ROL' FAKTOROV PEPTIDNOI PRIRODY V KOMPENSATORNYKH PROTSESSAKH V TSENTRAL'NOI NERVNOI SISTEME]**

G A VARTANIAN and B I KLEMENTEV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologiya Cheloveka, vol 9, Jan-Feb 1983, p 122-129 In Russian refs

The specific participation of low and high molecular weight proteins in the mechanisms of the pathogenesis and the compensation of locomotor function in models of unilateral lesions of the structures of the motor analyzer is examined. The temporal patterns of the activation of these peptides in the brain tissue and the cerebrospinal fluid are investigated. It is shown that the low molecular weight peptide factor of positional asymmetry is primarily located, and perhaps synthesized, in the hypophysis. The high molecular weight peptide factor, found in the brain tissues and in the cerebrospinal fluid at an extended period after the lesion, arrests the posttraumatic late asymmetry of the posterior extremities. The strict specificity of action of this factor, similar to

that of the positional asymmetry factor, on the side of the lesion, is evidence of the key role of these neuropeptides in the mechanisms of the pathogenesis and the compensation of central locomotor dyskinesia. N B

A83-22981

**REPEATED EXPOSURES TO HIGH LEVELS OF PLUS G ACCELERATIONS - CONSEQUENCES FOR THE MYOCARDIUM AND THE CARDIOVASCULAR SYSTEM [EXPOSITIONS REPETEEES AUX ACCELERATIONS PLUS GZ DE HAUT NIVEAU - CONSEQUENCES SUR LE MYOCARDE ET LE SYSTEME CARDIOVASCULAIRE]**

P BORREDON, P LISCIA, A HAZIOT, and P QUANDIEU (Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 420-424 In French refs

An examination of the effects of repeated exposures to high g accelerations by the centrifugation of rabbits is described. The subjects were restrained with the Z-axis of the main blood vessels parallel to centripetal acceleration, then exposed 3 or 4 times a week for 3-6 weeks to three sessions of 6-9 g forces for 20-40 sec. A second group of rabbits was restrained, but not centrifuged, while a third group served as controls. Measurements were taken of the femoral arterial pressure and the left ventricular pressure (LVP) and the derivative of LVP was calculated. Determinations were made of the coronary ATP, ADP, creatine phosphate, and glycogen levels. A 40 percent increase in the systolic AP, a 16 percent increase in the diastolic AP, a 14 percent increase in the systolic LVP, and a derived maximum time-dependent change of the LVP was found to be 50 percent. A positive correlation was detected between the effect of centrifugation (increases) and a depletion of the myocardial energy reserves, particularly glycogen. M S K

A83-22986

**VERIFICATION TRIALS FOR A PRIMATE PHYSIOLOGICAL EXPERIMENTATION MODEL INTENDED FOR SPACELAB [ESSAIS DE VALIDATION D'UN MODELE D'EXPERIMENTATION PHYSIOLOGIQUE SUR PRIMATE POUR SPACELAB]**

C L MILHAUD, B G CAILLER, and P C PESQUIES (Service de Sante des Armees, Paris, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 440-443 In French refs

Features of a bioinstrumentation apparatus for automatic data recording of physiological parameters of a subject rhesus monkey on board Spacelab are described. The continuously monitored attached sensors permit a reliable tailoring of the experiments for each flight, monitoring of a wakeful animal, and design advantages because of the short flight duration. The animal experimentation module will contain pulse and ECG recorders fed by thoracically implanted sensors, respiratory rate monitors linked to the animal by an elastic belt, and arterial pressure tracked through a sensor implanted in the thoracic aorta. Additional data will be gathered on the core and subcutaneous temperatures, blood samples using a remotely controlled peristaltic pump connected to a venous catheter valve, and urine samples. The experimental data gathering circuitry is carried in a sealed package by the monkey. M S K

A83-23023

**A P-31 NMR STUDY OF THE METABOLISM OF PHOSPHOROUS-CONTAINING COMPOUNDS IN THE LIVERS OF MICE IN CONDITIONS OF STRESS [IZUCHENIE METODOM IAMR R-31 METABOLIZMA FOSFORSODERZHASHCHIKH SOEDINENII V PECHENI MYSHI V USLOVIAKH STRESSA]**

V Z DUBINSKII and L A SIBELDINA (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Biofizika, vol 28, Jan-Feb 1983, p 92-95 In Russian refs

N83-23024

**THE ACCELERATION OF LIPID PEROXIDATION BY THE ACTION OF ELECTROMAGNETIC RADIATION OF THE MILLIMETER RANGE [USKORENIE PEREKISNOGO OKISLENIIA LIPIDOV POD DEISTVIEM ELEKTROMAGNITNOGO IZLUCHENIIA MILLIMETROVOGO DIAPAZONA]**

V S SHAROV, K D KAZARINOV, V E ANDREEV, A K PUTVINSKII, and O V BETSKII (Akademiia Nauk SSSR, Institut Radioelektroniki, Moscow, USSR) Biofizika, vol 28, Jan-Feb 1983, p 146, 147 In Russian refs

N83-17044 Royal Aircraft Establishment, Farnborough (England)

**THE ROLE OF BOUND WATER IN THE ELECTRO-RHEOLOGICAL EFFECT**

Y F DEINEGA, K K POPKO, and N Y KOVGANICH Jun 1982 8 p refs Transl into ENGLISH from Dopov Akad Nauk Ukr RSR, Ser B (USSR), no 9, 1975 p 807-810 (RAE-TRANS-2090, BR85534) Avail Issuing Activity

The dependence of electro-rheological effect upon hydration level of the disperse phase was studied using a 25% suspension of potato starch in vaseline oil. It is shown that as the moisture content of the disperse phase is increased, the electro-rheological effect passes through a maximum. As the electrical field intensity is increased, the positions of such maxima shift forwards lower moisture levels. The I/V characteristic is non-linear. It is to be noted that the electro-rheological maxima are attained at moisture contents consistent with the water being in a bound state

Author

N83-17045\* National Aeronautics and Space Administration Pasadena Office, Calif

**ENHANCEMENT OF IN VITRO GUAYULE PROPAGATION Patent**

M N DASTOOR (JPL, California Inst of Tech, Pasadena), W W SCHUBERT (JPL, California Inst of Tech, Pasadena), and G R PETERSEN, inventors (to NASA) (JPL, California Inst of Tech, Pasadena) 30 Jun 1981 7 p Filed 30 Jun 1981 Supersedes N81-29728 (19 - 20, p 2811) Sponsored by NASA (NASA-CASE-NPO-15213-1, US-PATENT-4,363,188, US-PATENT-APPL-SN-280153, US-PATENT-CLASS-47-58, US-PATENT-CLASS-71-98) Avail US Patent and Trademark Office CSCL 06C

A method for stimulating in vitro propagation of Guayule from a nutrient medium containing Guayule tissue by adding a substituted trialkyl amine bioinducing agent to the nutrient medium or called Selective or bioregulated propagation of shoots or callus is obtained by varying the amounts of substituted trialkyl amine present in the nutrient medium. The luxuriant growth provided may be processed for its poly isoprene content or may be transferred to a rooting medium for production of whole plants as identical clones of the original tissue. The method also provides for the production of large numbers of Guayule plants having identical desirable properties such as high polyisoprene levels

Official Gazette of the U S Patent and Trademark Office

N83-17046\*# National Aeronautics and Space Administration, Washington, D C

**GLOBAL BIOLOGY RESEARCH PROGRAM: PROGRAM PLAN**

Jan 1983 111 p refs (NASA-TM-85629, EBT-3, NAS 1 15 85629) Avail NTIS HC A06/MF A01 CSCL 06C

Biological processes which play a dominant role in these cycles which transform and transfer much of this material throughout the biosphere are examined. A greater understanding of planetary biological processes as revealed by the interaction of the biota and the environment. The rationale, scope, research strategy, and research priorities of the global biology is presented E A K

N83-17047\*# National Aeronautics and Space Administration, Washington, D C

**PLANT SEEDS IN BIOLOGICAL RESEARCH IN SPACE**

A T MILLER Oct 1982 16 p refs Transl into ENGLISH from Izv Akad Nauk Latv SSR (USSR), no 7(372), 1978 p 82-89 Transl by Kanner (Leo) Associates, Redwood City, Calif Original doc prep by Latvian SSR Academy of Sciences (Contract NASW-3541) (NASA-TM-77163, NAS 1 15 77163) Avail NTIS HC A02/MF A01 CSCL 06C

Data of 15 years of space flight and laboratory tests of plant seeds of 20 species, mainly on the combined and separate effects of launch vibration, ionizing radiation and weightlessness, are surveyed. It is concluded that plants do not show a pronounced response to space flight factors. Conditions of return to Earth, the number of heavy cosmic ray particles striking biological targets and effects of change in magnetic and electromagnetic fields have been little studied, and that more study of growing plants in space is needed E A K

N83-17048\*# National Aeronautics and Space Administration, Washington, D C

**USE OF PHYTOCHROME-DEPENDENT REACTION IN EVALUATING THE EFFECT OF SPACE FLIGHT FACTORS ON THE PLANT ORGANISM**

B A SHTEYNE, L V NEVZGODINA, and A T MILLER Nov 1982 11 p refs Transl into ENGLISH from Izv Akad Nauk Latv SSR (USSR), no 11(412), 1981 p 94-99 Original language doc announced as A82-31547 Transl by Kanner (Leo) Associates, Redwood City, Calif Original doc prep by Latvian SSR Academy of Sciences (Contract NASW-3541) (NASA-TM-77174, NAS 1 15 77174) Avail NTIS HC A02/MF A01 CSCL 06C

The effects of space flight factors on lettuce seeds aboard the Kosmos-936 and Kosmos-1129 satellites for 20 days were studied. The phytochrome dependent (PD) reaction of light sensitive seeds was a sensitive criterion for evaluating the biological effects of space flight factors. The PD reaction of air dry lettuce seeds was suppressed after space flight, especially if the seeds were exposed to open space during the flight. Space flight affects the physiological activity of both phytochrome forms, and both the phi sub 730 dependent reactions of lettuce seeds were suppressed E A K

**N83-17049# School of Aerospace Medicine, Brooks AFB, Tex TRAINING PROCEDURE FOR PRIMATE EQUILIBRIUM PLATFORM Final Report, Jan. - Mar. 1982**

D BURKE and C T BENNETT Aug 1982 10 p refs (Contract AF PROJ 7757) (AD-A119978, SAM-TR-82-24) Avail NTIS HC A02/MF A01 CSCL 14B

Rhesus monkeys (M Mulatta) were trained to maintain a primate equilibrium platform in a relatively horizontal position by a control stick. Training procedure consisted of seven phases. Progression from one phase to the next was contingent on successful completion of the current phase. Criterion for success was defined for each phase GRA

**N83-17050# Los Alamos Scientific Lab, N Mex FUTURE RESEARCH ON ANIMAL TEMPERATURES USING ELECTRONIC EQUIPMENT**

S B NOTT and G L SEAWRIGHT Nov 1981 22 p refs (Contract W-7405-ENG-36) (DE82-004682, LA-8883) Avail NTIS HC A02/MF A01

Available literature on animal temperature is reviewed and research priorities, using newly developed electronic identification and temperature-sensing equipment, are suggested. Applications to beef-cattle, dairy-cattle, and swine operations receive major attention. Skepticism of existing temperature data obtained with rectal thermometers is expressed. Physiological control of animal temperature is described as is the new monitoring technology (transponders and battery-operated radio transmitters). Primary

emphasis is given to the diseases and managerial applications where temperature monitoring equipment is likely to be most profitable  
DOE

**N83-17051#** Indiana Biolab, Palmyra  
**MICROORGANISMS FOR FERMENTATION OF CROP RESIDUES**  
**Final Technical Report**

H EDDLEMAN 1981 2 p  
(Contract DE-FG02-80R5-10222)  
(DE82-006912, DOE/R5-10222/1) Avail NTIS HC A02/MF A01

The construction of a device for freeze drying cultures and the accumulation of about 200 fungi which decompose cornstalks are described  
DOE

**N83-18191#** Army Medical Intelligence and Information Agency, Washington, D C  
**MILITARY MEDICAL JOURNAL, NO. 8, AUGUST 1982**

Aug 1982 144 p refs Transl into ENGLISH of Voenno-Med Zh (Moscow), no 8, Aug 1982 81 p  
(L-2130) Avail NTIS HC A07/MF A01

Increasing the working capacity of persons subject to extended sensory overloads and therapeutic-prophylactic measures in eye diseases among flight personnel are discussed

**N83-18194#** University Coll, Cardiff (Wales) Dept of Applied Mathematics and Astronomy  
**AN ESSAY ON GENETICS**

F HOYLE and N C NICKRAMASINGHE Apr 1982 46 p refs Submitted for publication  
(PREPRINT-76) Avail NTIS HC A03/MF A01

For definiteness, we take the model to have a constant population of  $N$  individuals with  $N$  a large even number, say  $N = 10,000$ . One half of the population is to be female with the same  $X$  chromosomes, while the males all have the same  $X$  chromosomes as the females and the same  $Y$  chromosomes among themselves. The other chromosomes are homozygous except for a single gene,  $A$ , which will be taken to be neutral to survival in the first part of this essay. Divide the  $N$  individuals into  $N/2$  mating pairs, the associations being random. Let each such pair have two surviving offspring that regenerate the population in the next generation, with the number of males and females maintained equal (in the manner specified below). Then continue from generation to generation in the same way  
Author

**N83-18195#** University Coll, Cardiff (Wales) Dept of Applied Mathematics and Astronomy  
**PROOFS THAT LIFE IS COSMIC**

F HOYLE and N C WICKRAMASINGHE Aug 1982 292 p refs Submitted for publication  
(PREPRINT-83) Avail NTIS HC A13/MF A01

The theory that life is cosmic is argued. Different aspects of this argument are presented in relation to the atmosphere, bacteria, comets, diseases, evolution, interstellar grains, meteorites, origin of life, and planets  
S L

**N83-18196#** Deutsches Inst fuer Medizinische Dokumentation und Information, Cologne (West Germany)  
**USER ORIENTED SUPPLY OF INFORMATION BY DEVELOPMENT AND OPERATION OF AN INFORMATION AND COMMUNICATION NETWORK REALIZED IN THE FIELD OF THE LIFE SCIENCES: DIMDINET Final Report, Jul. 1981**

R FRITZ, R GEORGE, H J GESENBERG, H E KURZWELLY, and G PLATE Bonn Bundesministerium fuer Forschung und Technologie Oct 1982 138 p refs In GERMAN, ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie  
(BMFT-FB-ID-82-006, ISSN-0170-8996) Avail NTIS HC A07/MF A01, Fachinformationszentrum, Karlsruhe, West Germany DM 29

Final report on the development and the operation of the information and communication-network DIMDINET for the online usage of databases by decentralized information service centres

(ISC) in the field of biomedicine (life sciences). Actions to be taken, problems and experiences encountered when setting up the infrastructure for the ISC are described. The results of the project DIMDINET related to activating and covering the information needs are displayed in extensive statistical data. The technical part shows the stepwise setup and operation of a private data network, lists the resulting consequences and includes the linkage to EURONET and DATEX-P. Also included is a detailed cost comparison between the data networks DIMDINET, EURONET and DATEX-P. Quantitative and qualitative data for planning may be derived from the results and experiences for setting up further ICS and for installing appropriate services in other infrastructures of the information community. The experiences gathered by DIMDI undertaking the pilot study have been fed back into various advisory groups for further planning and decision processes of various areas of the GERMAN and EUROPEAN information community  
Author

**N83-18197#** Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div  
**EFFECT OF PARTIAL RESTRAINT OF MOTOR ACTIVITY ON BASIC PHYSIOLOGICAL PROCESSES IN MONKEYS**

I D BOGINA, N A ROKOTOVA, Y S ROGOVENKO, and R L SHEYKIN 23 Aug 1982 13 p refs Transl into ENGLISH from Probl Kosmich Biol (USSR), no 4, 1965 p 308-315  
(AD-A120578, FTD-ID(RS)T-1127-82) Avail NTIS HC A02/MF A01 CSCL 06C

The physiological effects and functional state of monkey's nervous system of partial restraint of motor activity were investigated. It is found that chronic fixation has advantages over the movement restraint for short periods. It is shown that animals under prolonged motor activity conditions are useful in the study of space biology and physiology  
GRA

**N83-18198#** Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div  
**THE EFFECT OF PROLONGED RESTRAINT OF MOTOR ACTIVITY ON THE VITAL ACTIVITY OF MONKEYS**

N A ROKOTOVA, P D BOGINA, O P BOLOTINA, T M KUCHERENKO, Y S ROGOVENKO, and R L SHEYKIN 26 Aug 1982 15 p refs Transl into ENGLISH from Probl Kosmich Biol (USSR), no 2, 1962 p 417-427  
(AD-A120479, FTD-ID(RS)T-1128-82) Avail NTIS HC A02/MF A01 CSCL 06C

Factors affecting human physiology in extended space flights are discussed. The long term effects of restrained motor activity were studied. The physiological effects of a prolonged restraint on monkey behavior was evaluated. It is found that (1) prolonged restraint of motor activity does not affect vital activity, (2) monkeys in fixed conditions can be used for further studies, (3) the fixator design for chronic restraint of monkey mobility ensures a long term sustaining of the animal's normal physiological state  
GRA

**N83-18199#** Utah State Univ, Logan  
**BIOENERGETICS OF THE METHANOGENIC BACTERIA Annual Progress Report, 15 Mar. 1981 - 14 Mar. 1982**

J R LANCASTER, JR Jan 1982 10 p refs  
(Contract DE-AC02-81ER-10875)  
(DE82-010475, DOE/ER-10875/1) Avail NTIS HC A02/MF A01

By the use of nickel-61, a previously observed electron paramagnetic resonance signal present in *Methanobacterium bryantii* was identified as nickel in an environment of strong octahedral coordination. This is a new biological paramagnetic center and is the first observation by EPR spectroscopy of nickel in a biological system. Other electron transfer components were identified: (1) each of six species of methanogen contain HiPiP-type iron-sulfur centers, which could be due to hydrogenase, (2) flavin adenine dinucleotide was detected in preparations of *M. bryantii*, and a membrane associated flavoprotein was solubilized, (3) coorn is also associated with the particulate fraction. A soluble hydrogenase was isolated and partially purified  
DOE

## 51 LIFE SCIENCES (GENERAL)

**N83-18200#** Joint Publications Research Service, Arlington, Va  
**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 16, NO. 6, NOVEMBER - DECEMBER 1982**

O G GAZENKO, ed 17 Jan 1983 154 p refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 96 p

(JPRS-82654) Avail NTIS HC A08/MF A01

Various topics in aerospace medicine and space biology are discussed Weightlessness, hypokinesia, space suits, protein metabolism, psychophysiology, submersion effects, and life support systems are among the topics discussed

**N83-18207#** Joint Publications Research Service, Arlington, Va  
**ENERGETIC REACTIONS IN RAT SKELETAL MUSCLES AFTER SPACEFLIGHT ABOARD COSMOS-936 BIOSATELLITE**

E S MAILYAN, L B BURAVKOVA, and L V KOKOREVA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 45-49 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 34-37

Avail NTIS HC A08/MF A01

The respiration of mitochondria isolated from mixed skeletal muscles of hindlimbs of rats flown for 18.5 days on Cosmos-936 was investigated polarographically At 10 hours the rate of mitochondrial respiration in different metabolic states during the oxidation of succinic acid and NAD-dependent substrates declined The enzyme activity of mitochondrial cytochrome oxidase and cytosol lactate dehydrogenase diminished At 25 days both aerobic and anaerobic oxidative processes increased, thus leading to the recovery of the parameters (sometimes they not only returned to the norm but exceeded it) Author

**N83-18208#** Joint Publications Research Service, Arlington, Va  
**ACTIVITY OF TRICARBOXYLIC ACID CYCLE OXIDATIVE ENZYMES IN SKELETAL MUSCLES OF HYPOKINETIC RATS**

Y A GANIN *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 50-55 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 37-41

Avail NTIS HC A08/MF A01

The study of 165 rats exposed to 60-day hypokinesia demonstrated a decrease in the quantity of mitochondrial protein and a decline in the activity of mitochondrial forms of NADP-isocitrate dehydrogenase (NADP-ICDH) and NAD-malate dehydrogenase (NAD-MDH), as well as NAD-ICDH, succinate dehydrogenase (SDH), and alpha-ketoglutarate dehydrogenase (alpha-KGDH) The maximum decline in the protein content was seen on day 60, and in the enzyme activity on day 7 As the hypokinetic exposure continued, the activity of mitochondrial NAD-MDH and NADP-ICDH slightly increased The NADP-MDH activity decreased only at later stages of hypokinesia The changes in cytoplasmic NAD-MDH, NADP-ICDH and NADP-MDH were less expressed On day 25 of the recovery period the activity of NAD-ICDH and NADP-ICDH was significantly higher than in the controls, that of mitochondrial NAD-MDH returned to the normal, and the activity of SDH and alpha-KGDH remained noticeably lower M G

**N83-18209#** Joint Publications Research Service, Arlington, Va  
**INCREASED RAT SENSITIVITY TO SO<sub>2</sub> DURING LONG-TERM HYPOKINESIA**

A I BOKINA, V K FADEYEVA, and Y M VIKHROVA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 56-60 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 41-45

Avail NTIS HC A08/MF A01

The effect of atmospheric contaminants on animals exposed to prolonged hypokinesia was investigated A quantitative correlation between the resistance and the concentration of an

atmospheric contaminant (sulfur oxide) was established, using concentration-time and concentration-effect relations M G

**N83-18210#** Joint Publications Research Service, Arlington, Va  
**NYSTAGMIC REACTIONS OF RATS AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE**

A A SHIPOV and L A TABAKOVA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 61-65 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 45-48

Avail NTIS HC A08/MF A01

The vestibular nystagmus of rats flown for 18.5 days on Cosmos-1129 was examined with reference to the latent period, number of beats, duration, and the average velocity The nystagmus was elicited by increasing angular acceleration of 10, 20, 30 deg/sec(2) As compared to the controls, the flown animals showed a significant inhibition of the nystagmic reaction (P 0.001) The inhibition can be attributed to the desynchronization which developed inflight M G

**N83-18211#** Joint Publications Research Service, Arlington, Va  
**FLUID-ELECTROLYTE METABOLISM IN RATS IN DIFFERENT POSITIONS IN RELATION TO VECTOR OF EARTH'S GRAVITY**

V I BOGDANOV, V P KROTOV, and L Y KOLEMEYEVA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 66-69 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 48-50

Avail NTIS HC A08/MF A01

A prolonged maintenance of rats with the long axis of the body positioned at +15 or -15 deg to the horizontal influenced their fluid-electrolyte metabolism The experiments were carried out on 56 noninbred rats whose motor activity was diminished for 32 days A close correlation between fluid-electrolyte metabolism and body position was established As compared to the horizontal rats, the rats with the head at +15 deg showed decreases in body weight losses, diuresis, kali- and natriuresis, whereas the rats with the head at -15 deg exhibited increases of the parameters M G

**N83-18212#** Joint Publications Research Service, Arlington, Va  
**EFFECT OF DRUGS ON DEVELOPMENT OF STRESS REACTION IN RATS EXPOSED TO ACOUSTIC STIMULUS**

V N KOSTYUCHENKOV and V S YASNETSOV *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 70-74 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 50-54

Avail NTIS HC A08/MF A01

The experiments were carried out on 349 white rats weighing 150 to 200 g that were exposed to the stress effect of 130 dB sound Drugs were injected subcutaneously an hour before the animals were placed into a sound chamber In this situation the following drugs proved to be the most effective sound protectors, barbamyli, seduxen, aminazin, galoperidol, chloroprotixen, apressin, phenolamine, inderal, and dopegyt M G

**N83-18216#** Joint Publications Research Service, Arlington, Va  
**STUDY OF EFFECT OF WEIGHTLESSNESS ON THE AQUATIC FERN, AZOLLA**

Y Y SHEPELEV, N H THYOC, V A KORDYUM, G I MELESHKO, T B GALKINA, and V G MANKO *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 94-96 17 Jan 1983 Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 66-68

Avail NTIS HC A08/MF A01

An exposure to six-day weightlessness of the fern Azolla pinna R Br symbiotically related to the nitrogen fixing alga Anabena azollae did not affect the main biological characteristics (growth, development, and morphological structure) of both fern plants and

algae The exposure did not influence the growth rate or subsequent Azolla generations on the Earth Author

**N83-18219#** Joint Publications Research Service, Arlington, Va  
**DYNAMICS OF HOUSE FLY LARVA GROWTH ON SOME FORMS OF ORGANIC WASTE IN A BIOLOGICAL LIFE-SUPPORT SYSTEM**

Y G GOLUBEVA and T V YEROFEYEVA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov-Dec 1982 (JPRS-82654) p 106-109 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich. Med (Moscow), v 16, no 6, Nov-Dec 1982 p 74-76  
 Avail NTIS HC A08/MF A01

The time course of the growth of *Musca domestica* larvae on organic wastes (human and Japanese quail excrements) was studied as a function of the egg density. An increase in the density of the substrate contamination reduced the weight of pupae and III instar larvae. The density effect in the case of quail excrements was seen earlier than in the case of human excrements. The larval weight on quail excrements was much lower than on human excrements, the density of substrate contamination being equal. On human excrements larvae grew more actively than on quail excrements, the magnitude of their relative increase was higher beginning with the 2d day of development. The density effect and the time course of the larval growth on the substrates used show that human excrements are a better nutrient medium for fly larvae Author

**N83-18222#** Joint Publications Research Service, Arlington, Va  
**EFFECT OF SPACEFLIGHT ON LIPOGENESIS AND LIPOLYSIS IN RATS**

N SKOTTOVA, L MACHO, M PALKOVIC, and R A TIGRANYAN *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov-Dec 1983 (JPRS-82654) p 119-122 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov-Dec 1982 p 82-83  
 Avail NTIS HC A08/MF A01

When rats were flown for 22 days in space aboard Cosmos-605 biosatellite, they weighed less and there was a decrease in fatty tissue subcutaneously and in other fat reservoirs. Studies conducted aboard Cosmos-605, Cosmos-690 and Cosmos-782 revealed that prolonged exposure of rats to weightlessness was associated with some changes in lipid metabolism. The effect of spaceflight on activity of several enzymes involved in fat metabolism was investigated Author

**N83-18223#** Joint Publications Research Service, Arlington, Va  
**HORMONE CONCENTRATION IN RAT BLOOD PLASMA AFTER FLIGHT ABOARD COSMOS-936 BIOSATELLITE**

R A TIGRANYAN, L MACHO, R KWETNANSKY, and N F KALITA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov-Dec 1982 (JPRS-82654) p 123-127 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov-Dec 1982 p 84-87  
 Avail NTIS HC A08/MF A01

Investigations of vital physiological systems of animals, which were conducted in experiments aboard biosatellites of the Cosmos series showed that it is possible for mammals (rats) to adapt to long term weightlessness. At the same time, these experiments revealed that there were several signs of activation of the endocrine system, namely, the hypothalamo-hypophysis-adrenocortical part, which appeared under the effect of the set of spaceflight factors and rapid change to Earth's gravity. Studies of blood plasma corticosterone concentration in rats after termination of experiments aboard Cosmos-605, Cosmos-690 and Cosmos-782 revealed that corticosterone level is elevated in the first few hours after the spaceflights. Then the plasma corticosterone level drops and is already considerably lower than the control level 24 h postflight. The spaceflight aboard Cosmos-782 did not cause any significant changes in the hormonal status of animals. Submitted here are the results obtained after the flight aboard Cosmos-936 B W

**N83-18226#** Joint Publications Research Service, Arlington, Va  
**USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 26**

28 Dec 1982 70 p refs Transl into ENGLISH from various Russian articles  
 (JPRS-82544) Avail NTIS HC A04/MF A01

Psychophysiological pilot training, pilot psychology in civil aviation, and raising body resistance to effects of environmental chemical pollutant are discussed

## 52

## AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation, and weightlessness

## A83-19929

**AUDITORY MECHANISMS OF RHYTHM ANALYSIS [SLUKHOVYE MEKHANIZMY ANALIZA RITMA]**

V P IAKHNO and I A LIUBINSKII (Akademiia Nauk SSSR, Institut Problem Upravleniia, Moscow, USSR) *In* Sensory systems Hearing Leningrad, Izdatel'stvo Nauka, 1982, p 32-44 *In* Russian refs

Experimental investigations concerning the process of rhythm perception by humans are reviewed, and results are presented of psychophysical experiments in which sequences of rectangular impulses (clicks) are used as the experimental rhythmic signals. An algorithmic model of the process of rhythmic perception is developed using the results of these investigations. The model comprises a description of the rhythmic structure of signals in the language of experimentally elucidated subjective parameters, including the integer characteristic of the length ratio of the fractions, the base unit interval determining the tempo, and the level of the percussion of the fractions. A conclusion about the sensation of tempo is experimentally verified which shows that it depends not only on the period, but also on the length ratio of the fractions of the rhythmic signal N B

## A83-19932

**THE SLOW LATENT AUDITORY EVOKED POTENTIAL OF HUMANS [KOROTKOLATENTNYI SLUKHOVOI VYZVANNYI POTENTIAL CHELOVEKA]**

S N KHECHINASHVILI and Z SH KEVANISHVILI (Tbilisskii Gosudarstvennyi Institut Usovershenstvovaniia Vrachei, Tbilisi, Georgian SSR) *In* Sensory systems Hearing Leningrad, Izdatel'stvo Nauka, 1982, p 87-108 *In* Russian refs

The components and the frequency composition of brain-stem or slow latent auditory evoked potentials (SLAEPs) are analyzed. The dependence of the SLAEP parameters on the phase of the auditory stimulus is examined. The SLAEPs which are recorded in conditions of monaural and binaural auditory stimulation are evaluated. The effects of prolonged auditory stimulation are studied, as well as those of natural and drug-induced sleep. A model is developed to elucidate the component selectivity of conditioning auditory stimulation. The SLAEPs which are recorded during various localizations of the electrode leads are compared. A recommendation is presented for the clinical use of SLAEP registration methods, and mechanisms for the generation of SLAEPs are evaluated N B



A83-20335

**AN INVESTIGATION OF THE DISCRIMINATION CAPABILITY OF THE VISION OF A HUMAN OPERATOR DURING VESTIBULAR INFLUENCES [IZUCHENIE RAZLICHITEL'NOI SPOSOBNOSTI ZRENIIA CHELOVEKA-OPERATORA PRI VESTIBULIARNYKH VOZDEISTVIIAKH]**

E A IVANOV, V A SUTORMIN, and M L KHACHATURIANTS  
In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 67-70 In Russian refs

Results of an experimental investigation are presented concerning the effect of vestibular discomfort on the level of the discrimination capability of an operator's vision during a three-day regime of constant activity. Among other results, it was found that the discrimination capability of the human operators varied in a diurnal oscillating pattern. In addition, a rigid stabilization of visual functions was found during the action of external influences, although it varied considerably during the course of the diurnal cycle. N B

A83-20336

**THE ACTIVITY OF A HUMAN OPERATOR DURING VESTIBULAR PERTURBATIONS [K DEIATEL'NOSTI CHELOVEKA-OPERATORA PRI VESTIBULIARNYKH VOZMUSHCHENIIAKH]**

V A SUTORMIN and M L KHACHATURIANTS In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 70-75 In Russian refs

Results are presented for a series of experiments studying the work capacity of operators under conditions of constant activity and vestibular perturbations (rocking motions). The experimental method is based on the measurement of errors in the operators' tracking a visual signal with the motion of their hands. Significant shifts in the work capacity of the operators were detected, which indicate distinctive changes of the body to this type of perturbation as distinct from variations due to diurnal rhythm. Possible methods for decreasing the undesirable consequences of this type of fatigue are examined. N B

A83-20350

**THE EFFECT OF CHANGES OF THE REGIME OF WORK AND REST ON THE PSYCHOPHYSIOLOGICAL EFFICIENCY OF AN OPERATOR [VLIANIE IZMENENNYKH REZHIMOV TRUDA I OTDYKHA NA PSIKHOFIZIOLOGICHESKIE VOZMOZHNOСТИ OPERATORA]**

A K EPISHKIN In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 162-166 In Russian refs

The dependence of the psychophysiological efficiency and the reserves of an operator on the amount of dislocation in the diurnal regime of work and rest was investigated. Three regimes were utilized having 3, 5, and 11 hour work periods with identical types of work required, as well as identical visual stimuli during work. Results showed that the patterns of work capacity and physiological functions were divided into three periods. The adaptive period was characterized by a decrease in the work capacity and an increase in the stress on the physiological functions of the operators. Then a recovery and stabilization period in the work capacity and the physiological function of the operators was observed. Finally, a period of decreased work capacity was observed, which was characterized by an increased fatigue in the operators. N B

A83-20354

**EVOKED POTENTIALS /EP/ AND THE PROCESSING OF SENSORY INFORMATION IN THE VISUAL SYSTEM OF HUMANS [VYZVANNYE POTENTSIALLY /VP/ I OBRABOTKA SENSORNOM INFORMATSII V ZRITEL'NOI SISTEME CHELOVEKA]**

N N ZISLINA, V A TOLSTOVA, L A NOVIKOVA, I G KUMAN, and L I FILCHIKOVA (Akademii Pedagogicheskikh Nauk SSSR, Moscow, USSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 65-76 In Russian refs

The evoked potentials in response to the presentation of spatial and structural patterns were investigated in children who were between 7-17 years of age with normal vision and amblyopia. It was found that EPs can be utilized as age parameters of the visual system in humans. The role of the projection and anterior associative regions of the cortex in the processing of visual information is evaluated. Also examined are the maturing of sensory analysis in the process of human ontogenesis and the neurophysiological mechanisms of the disruption of visual functions during the deprivation of regular vision. N B

A83-20355

**THE ASYMMETRY OF THE BRAIN HEMISPHERES FROM THE VIEWPOINT OF THE IDENTIFICATION OF VISUAL FORMS [ASIMMETRIIA POLUSHARII GOLOVNOGO MOZGA S TOCHKI ZRENIIA OPOZNANIIA ZRITEL'NYKH OBRAZOV]**

L I LEUSHINA, A A NEVSKAIA, and M B PAVLOVSKAIA (Akademii Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 76-92 In Russian refs

A83-20357

**THE SPATIAL PARAMETERS OF COLOR VISION IN HUMANS [PROSTRANSTVENNYE PARAMETRY TSVETOVOGO ZRENIIA CHELOVEKA]**

A V BERTULIS, D S SAUDARGENE, S A IAKUBENENE, A I GUTASUKAS, I A M BERTULENE, R I TSITVARAS, and V I PATRIUBAVICHUS (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 139-155 In Russian refs

The dependence of the achromatic and chromatic thresholds of color stimuli on various conditions of adaptation is investigated using psychophysiological experiments. The spatial summation and the patterns of color perception during brightness contrast and in conditions of equivalent brightness are studied. The spatial-frequency characteristics of the color vision of humans, the characteristics of the separation of colored objects from the background, and the identification of colored geometrical figures are examined. It is shown that the visual system is not capable of separating a colored object from the background in conditions of equivalent brightness. If the size of the object does not exceed definite limits, then the object fuses with the background and acquires its color. The limiting size of the objects depends on the conditions of adaptation, on the combination of colors, and especially on the color of the background. The effect of the fusing of colors also occurs for objects of equivalent size and brightness, although these conditions bring about complex colors. It is proposed that color mechanisms possess a collection of spatial-frequency filters, which are tuned to comparatively low spatial frequencies. N B

A83-20358

**ELECTROPHYSIOLOGICAL INVESTIGATIONS OF COLOR VISION IN HUMANS [ELEKTROFIZIOLOGICHESKIE ISSLEDOVANIIA TSVETOVOGO ZRENIIA CHELOVEKA]**

L P GRIGOREVA and A E FURSOVA (Akademii Pedagogicheskikh Nauk SSSR, Moscow, USSR) In Sensory systems Vision Leningrad, Izdatel'stvo Nauka, 1982, p 156-169 In Russian refs

The problem of color vision in humans is investigated using analysis of electroretinograms (ERG) and visual cortical evoked potentials (EP). The dependence of the characteristics of the chromatic-ERG and the steady and phasic EPs on the color tone,

the brightness and visibility of monochromatic spatially unstructured fields, the clearness of the contours, and the contrast and size of the elements of color representation are examined. The presence in the visual system of parallel channels for the processing of information about the signs of the chromatic spatially unstructured fields and complex representations is evaluated based on the experimental results of this study and a comparison with neuronal-level data. It is proposed that the analysis of information in the color-specific channels of brightness, chromatic tone, and form is carried out by different mechanisms. N B

#### A83-20359

##### THE AMPLITUDE-FREQUENCY AND AUTOCORRECTION ANALYSIS OF FIXATION MICROSACCADIC EYE MOVEMENTS [AMPLITUDNO-CHASTOTNYI I AVTOKORRELIATSIONNYI ANALIZ FIKSATIONNYKH MIKROSKACHKOV GLAZ]

B A KARPOV, A N KARPOVA, and V V ZELENKIN (Psikhiatricheskaya Bol'nitsa, Leningrad, USSR) In *Sensory systems Vision* Leningrad, Izdatel'stvo Nauka, 1982, p 196-207 In Russian refs

Two main types of fixation microsaccadic eye movements are examined: the counter drift divergence of the gaze (correctional movements) and microsaccadic movements of the P-type when the divergence of the gaze from the goal and the compensation for this are carried out by the microsaccadic movements. The first type of eye micromovements is called tonic-phasic, and the second type is phasic-phasic. It is shown that these types of fixation activities are significantly different in terms of a variety of characteristics. In the phasic-phasic type of fixation, the frequency at which the microsaccadic movements begin is significantly higher than during the tonic-phasic type (1.81 and 0.68 Hz respectively). The noise-free forms of phasic-phasic activity display a regular change in the direction of the sequence of the microsaccadic movements and a strong periodicity in the amplitude modulation of the microsaccadic movements with various periods of modulating oscillations. Possible mechanisms for the phasic-phasic system for the stabilization of the gaze relative to the goal are discussed. N B

#### A83-20383

##### MEANS FOR INCREASING ATHLETIC FITNESS - TECHNICAL AND APPLIED MILITARY ASPECTS OF ATHLETICS [PUTI POVYSHENIYA SPORTIVNOI RABOTOSPOSOBNOSTI - TEKHNIЧЕСКИЕ I VOENNO-PRIKLADNYE VIDY SPORTA]

V S RAZVODOVSKII, S K ANDREEVA, I V MAZUROV, A A KRASNIIKOV, K G NAZHMUDINOV, V A LIUSOV, A I MARTYNOV, and V G BORISOV (Moscow, Izdatel'stvo DOSAAF SSSR, 1982 152 p) In Russian refs

A collection of articles is presented concerning pedagogical, psychological, medical, and pharmacological methods for increasing the fitness of athletes. Topics discussed include the types of aerobic fitness and their significance for determining athletic specialization, problems in increasing the fitness of athletes and pilots, and psychological methods for raising athletic fitness. Also examined are medical methods for increasing athletic fitness, including the role of diet, vitamins, and pharmacological drugs. N B.

#### A83-20778

##### EFFECTS OF HYPOXIA ON THE LUMINANCE THRESHOLD FOR TARGET DETECTION

J KOBRICK (U S Army, Research Institute of Environmental Medicine, Natick, MA) *Aviation, Space, and Environmental Medicine*, vol 54, Feb 1983, p 112-115 refs

A technique is described - for determining luminance thresholds for detection of realistic target objects - which is suitable for use in simulators and environmental chambers. Data obtained by this technique during a 10-d exposure to high altitude indicate impairments of target detection in direct relation to target viewing distance, absolute target size, and length of hypoxia exposure. In general, impairments reached their maximum during the second day of exposure and recovered gradually thereafter. Wide

differences among individual observers were noted. Implications of the results are discussed. (Author)

#### A83-20779

##### OCULAR FUNCTIONS AND INCIDENCE OF ACUTE MOUNTAIN SICKNESS IN WOMEN AT ALTITUDE

P O KRAMAR, B L DRINKWATER, L J FOLINSBEE, and J F. BEDI (Seattle Public Health Hospital, Washington, University, Seattle, WA) *Aviation, Space, and Environmental Medicine*, vol 54, Feb 1983, p 116-120. Research supported by the National Geographic Society and Research to Prevent Blindness, Inc refs

The effects of altitude on a series of ocular functions were studied on seven expedition members, all women aged 23-53 years, during the first ascent of the 6798-m peak Brigupanth in the Indian Himalayas. The only consistent change was a decrease in convergence amplitude. The amplitude of accommodation remained stable among the younger climbers, but decreased markedly among the older ones as higher altitudes were reached. There also appeared to be a lessened vascular reactivity to the hypoxia of altitude in the older members. Stereoscopic vision was unimpaired at all altitudes tested and extra-ocular muscle balance remained unaffected in all but two members who had an increase in their baseline phorias. Two of the summit climbers developed retinal hemorrhages. There was an average weight loss of 5.4 kg during the climb, but general health was good. Symptoms of acute mountain sickness were noted infrequently, and there were only moderate changes in the menstrual cycle. (Author)

#### A83-20780

##### CHEMORECEPTOR SENSITIVITY IN ADAPTATION TO HIGH ALTITUDE

L MATHEW, P M GOPINATH, S S PURKAYASTHA, J SEN GUPTA, and H S NAYAR (Defence Institute of Physiology and Allied Sciences, Delhi, India) *Aviation, Space, and Environmental Medicine*, vol 54, Feb 1983, p 121-126 refs

Studies were carried out in a group of 20 young male subjects to investigate the changes in chemoreceptor sensitivity during acclimatization to altitude. Their hypoxic sensitivity and carbon dioxide sensitivity were studied at Delhi, during acclimatization at 3500 m, and on return to sea level. Similar studies were also done in a group of 10 acclimatized lowlanders who stayed at 3500-4000 m for 12-14 months, and also on 10 high-altitude natives. The results showed no significant alteration in the hypoxic sensitivity of the lowlanders, but CO<sub>2</sub> sensitivity was markedly elevated at altitude, both in sojourners and acclimatized lowlanders. The high-altitude natives showed less sensitivity to hypoxia, whereas the CO<sub>2</sub> sensitivity was normal. (Author)

#### A83-20782

##### EFFECTS OF TRAVEL ACROSS TIME ZONES /JET-LAG/ ON EXERCISE CAPACITY AND PERFORMANCE

J E WRIGHT, J A VOGEL, J B SAMPSON, J J KNAPIK, J F PATTON, and W L DANIELS (U S Army, Research Institute of Environmental Medicine, Natick, MA) *Aviation, Space, and Environmental Medicine*, vol 54, Feb 1983, p 132-137 refs

Eighty-one healthy male soldiers, aged 18-34, are investigated for 5 days before and 5 days after an eastward deployment across six time zones to determine the effects of translocation on exercise capacity and performance. Fatigue, weakness, headache, sleepiness, irritability, and other commonly reported symptoms are found to occur in the majority of subjects. Most, but not all, of the symptoms, are diminished or gone by the fifth day after the translocation. Cardiorespiratory function and perception of effort during both submaximal and maximal treadmill exercise are unaffected. The isometric strength of the upper torso, legs, and trunk extensor muscles is also not changed. The dynamic strength and endurance of elbow flexors are found to decline significantly. Dynamic knee extensor strength and endurance cores show a progressive decline before translocation and are inconsistent, suggesting that the stress of repetitive testing outweighs any jet-lag effects on performance capacity. C R

**A83-20783****RESPONSE OF AGE FORTY AND OVER MILITARY PERSONNEL TO AN UNSUPERVISED, SELF-ADMINISTERED AEROBIC TRAINING PROGRAM**

J F PATTON, J A VOGEL, J BEDYNEK, D ALEXANDER, and R ALBRIGHT (U.S. Army, Research Institute of Environmental Medicine, Natick, MA, Office of the Surgeon General, Washington, DC, Dwight D Eisenhower Army Medical Center, Fort Gordon, Martin Army Community Hospital, Fort Benning, GA) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 138-143 refs

The efficiency of an unsupervised Army program of aerobic exercises for personnel over 40 yr old was examined through monitoring of the fitness of 161 male subjects. The program comprised a progressive walk/run exercise leading up to a 2 mi run. Measurements of the maximal oxygen uptake (VO<sub>2</sub> max) before and after training were performed, together with body dimensions, percent body fat, and breath analysis during an endurance trial on a treadmill. A total of 161 subjects were surveyed at the end of the 6 mo test program. The presence of overweight subjects and smokers is discussed as to their effect in producing a low 4.4% VO<sub>2</sub> max increase over the trial interval. It is suggested that a significant proportion of the subjects did not comply with the training procedures. Voluntary participation in fitness programs is not sufficient incentive to encourage active participation, and supervision may be necessary to reinforce individual motivation and interest. M S K

**A83-20785\*** National Aeronautics and Space Administration  
Lyndon B Johnson Space Center, Houston, Tex  
**THE DIAGNOSTIC ACCURACY OF EXERCISE ELECTROCARDIOGRAPHY - A REVIEW**

R L JOHNSON and M W BUNGO (NASA, Johnson Space Center, Medical Research Branch, Houston, TX) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 150-157 refs

The cardiovascular 'stress test', and particularly the graded treadmill exerciser test, has gained wide acceptance as a diagnostic aid in searching for ischemic heart disease and as a prognostic indicator for those with known coronary artery disease. Controversies still exist, however, in its use in mass screening and in interpreting equivocal tests. A review of the use and value of electrocardiographic exercise testing is presented. Topics such as its use in asymptomatic individuals, the adjuvant use of clinical examination, and the examination of ancillary treadmill parameters are presented. No attempt is made to detail the very significant contributions of radionuclide scanning. The positive exercise electrocardiogram in the asymptomatic subject is discussed and guidelines for clinical management are offered. (Author)

**A83-20786****PLEURODESIS - THE RESULTS OF TREATMENT FOR SPONTANEOUS PNEUMOTHORAX IN THE ROYAL AIR FORCE**

J A C HOPKIRK, M J PULLEN, and J R FRASER (RAF, Chest Unit, King Edward VII Hospital, Midhurst, Sussex, England) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 158-160 refs

A retrospective survey of all patients undergoing silver nitrate pleurodesis for treatment of spontaneous pneumothorax was undertaken. Of the patients, 7% had a recurrence on the treated side and 14% subsequently developed a pneumothorax on the opposite side. The aeromedical implications are discussed. (Author)

**A83-20787****SUDDEN INCAPACITATION - USAF EXPERIENCE, 1970-80**

R B RAYMAN (USAF, Hospital, England AFB, LA) and G B MCNAUGHTON (USAF, Inspection and Safety Center, Norton AFB, CA) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 161-164

During the period 1970-80, there were reported 146 cases of in-flight sudden incapacitation in the USAF. Of these, 62 involved pilots, 14 were navigators, and 70 were student pilots. The

etiologies of sudden incapacitation included illness without loss of consciousness, loss of consciousness, spatial disorientation, and improper M-1 maneuver. Each of these categories is analyzed with emphasis upon prevention, for example, not flying with symptomatic preexisting disease, continued emphasis upon spatial disorientation training, and correct performance of the M-1 maneuver. Based upon the data, conclusions and recommendations are suggested to minimize the risk of episodes of in-flight sudden incapacitation. (Author)

**A83-20876****THE IMPAIRMENT OF THE DEFENSIVE AND ADAPTIVE MECHANISMS OF THE EAR AS A RESULT OF THE EXPOSURE TO NOISE [NARUSHENIE ZASHCHITNO-ADAPTATSIONNOGO MEKHANIZMA UKHA V REZULTATE VOZDEISTVIA SHUMA]**

I I VARENIKOV (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigeny Vodnogo Transporta, USSR) Vestnik Otorinolaringologii, Jan-Feb 1983, p 18-21. In Russian refs

**A83-20877****THE DIAGNOSIS OF LATENT VESTIBULAR DISORDERS IN PATIENTS WITH OTOSCLEROSIS [DIAGNOSTIKA SKRYTYKH VESTIBULIARNYKH NARUSHENII U BOL'NYKH OTOSKLEROZOM]**

A M STAROSTENKO (Leningradskii Nauchno-Issledovatel'skii Institut po Bolezniam Ukha, Gorka, Nosa i Rechi, Leningrad, USSR) Vestnik Otorinolaringologii, Jan-Feb 1983, p 32-36. In Russian refs

A method is developed to quantitatively assess the functions of the vestibular system in patients with otosclerosis. Diagnostic formulas are developed using three parameters of vestibular nystagmus (the response duration, the average speed of the slow component of nystagmus, and the frequency of nystagmus) for individuals with no auditory or vestibular pathology. These formulas are compared with electronystagmograms obtained from patients with otosclerosis in cold stimulation of the labyrinth. It was found that 2/3 of all patients examined exhibited signs of latent vestibular disorders, most often in the slow component of nystagmus. The frequency of nystagmus varied from normal less often, while the response duration changed insignificantly. It is proposed that this method can be used as an additional diagnostic test of the vestibular parameters in patients with otosclerosis. N B

**A83-20883****THE EFFECT ON THE HUMAN BODY OF A HIGH CONCENTRATION OF CARBON DIOXIDE AND HYPOKINESIA [VLIANIE NA ORGANIZM CHELOVEKA UGLEKISLOVOGO GAZA POVYSHENNOI KONTSENTRATSII I GIPOKINEZII]**

M A GREBENIK (Voenno-Meditsinskii Zhurnal, Dec 1982, p 59, 60. In Russian refs

**A83-20991****HISTOMETRIC INDICATORS OF THE STRUCTURE OF THE FEMORAL AND CRURAL MUSCLES OF CHILDREN, ADOLESCENTS, AND YOUNG MEN [GISTOMETRICHEskie POKAZATELI STROENIIA MYSHTS BEDRA I GOLENI U DETEI, PODROSTKOV I IUNOSHEI]**

IU A LAPKIN (Leningradskii Nauchno-Issledovatel'skii Detskii Ortopedicheskii Institut, Leningrad, USSR) Arkhiv Anatomii, Gistologii i Embriologii, vol 83, Oct 1982, p 59-65. In Russian refs

**A83-20993****THE FORMATION OF THE VASCULAR-RECEPTOR RELATIONS IN THE FOREARM MUSCLES OF HUMANS [STANOVLENIE SOSUDISTO-RETSEPTORNYKH OTNOSHENII V MYSHTSAKH PREDPLECH'IA CHELOVEKA]**

V M CHUCHKOV, A M ZAGREBIN, and L A ZAGREBIN (Izhevskii Meditsinskii Institut, Izhevsk, USSR) Arkhiv Anatomii, Gistologii i Embriologii, vol 83, Oct 1982, p 46-53. In Russian refs

A83-20995

**AN ATTEMPT TO PREVENT WEATHER-AGGRAVATED CARDIOVASCULAR DISEASES [OPYT PROFILAKTIKI OBOSTRENIY SERDECHNO-SOSUDISTYKH ZABOLEVANIY U METEOTROPNYKH BOL'NYKH]**

A. G. ZHUKOV, E. P. KUTINA, G. M. POKALEV, A. A. SPIRINA, and I. A. TOKMIANINA (Gorodskoi Otdel Zdravookhraneniya, Gorki, USSR) Zdravookhranenie Rossiiskoi Federatsii, no 10, 1982, p. 29-31. In Russian

The methods and results of a clinical test are presented which was undertaken in the attempt to predict and prevent the weather-aggravated incidence of cardiovascular diseases. Personal medical histories of the patients were collected, including the effects of weather on the conditions of the patients, and detailed information about the changing weather patterns was assembled, such as the barometric pressure, sunspot activity, and the infrasonic background. The patients most susceptible to changes in the weather were treated with various drugs for their conditions prior to the weather changes based on weather forecasts. Among other results, it was found that the use of these methods reduced the incidence of cardiovascular diseases among the 220 patients by an average of 40% during 1980. It is concluded that these methods were effective in lowering the incidence of weather-aggravated cardiovascular diseases during a period of unstable weather factors. N B

A83-20996

**PREVENTIVE SCREENING AS A METHOD FOR THE EARLY DETECTION OF CARDIOVASCULAR DISEASE IN RAILROAD WORKERS)**

I. U. P. NIKITIN, N. A. KUDELKINA, and V. I. PROVOROV (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR) Zdravookhranenie Rossiiskoi Federatsii, no 10, 1982, p. 13-15. In Russian

A83-20997

**THE PROGNOSIS OF ACUTE CARDIOVASCULAR DISEASES USING THE BIORHYTHM CURVES OF THE PATIENTS [PROGNOZIROVANIYE OBOSTRENIY ZABOLEVANIY SERDECHNO-SOSUDISTOY SISTEMY PO KRIVOY BIORITMOV BOL'NOGO]**

A. G. PONOMAREVA, E. G. SHEKHTER, and L. A. FOMINA (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Zdravookhranenie Rossiiskoi Federatsii, no 10, 1982, p. 11-13. In Russian

A83-20999

**THE DETERMINATION OF THE CIRCULATING IMMUNE COMPLEXES IN HUMANS [OPREDELENIE TSIRKULIRUYUSHCHIKH IMMUNNYKH KOMPEKSOV U CHELOVEKA]**

N. A. KONSTANTINOVA, V. V. LAVRENT'EV, L. V. KOVALCHUK, and R. V. PETROV (II Moskovskii Meditsinskii Institut, Moscow, USSR) Laboratornoe Delo, no 11, 1982, p. 673-676. In Russian refs

A general method is developed for determining the level of the circulating immune complexes in human blood serum. The method uses thermography to measure several indicators of the dynamics of the formation of these complexes and to evaluate the complement-linking activity of the immune complexes. The quantitative composition of the complexes was determined using this method for patients with glomerulonephritis and thromboembolism of the main arteries of the extremities. It is concluded that the thermographic method can be used effectively to measure the level of the circulating immune complexes. N B

**A83-21053\* National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Tex**  
**DISCORDANCE OF EXERCISE THALLIUM TESTING WITH CORONARY ARTERIOGRAPHY IN PATIENTS WITH ATYPICAL PRESENTATIONS**

M. W. BUNGO and O. S. LELAND, JR (NASA, Johnson Space Center, Medical Research Branch, Houston, TX, New England Deaconess Hospital, Harvard University, Harvard Medical School, Boston, MA) Chest, vol 83, Jan 1983, p. 112-116. refs

Eighty-one patients with diagnostically difficult clinical presentations suggesting coronary artery disease underwent symptom-limited maximal-exercise treadmill testing (ETT) and exercise radionuclide scanning with thallium-201 followed by coronary angiography. Results showed that in nearly half of the patients (47%) these tests were in agreement, while either exercise thallium or ETT was positive in 94% of patients with coronary artery disease. It was found that agreement between exercise thallium and ETT tests predicted disease in 92% of the instances or excluded disease in 82% of the instances. It is concluded that despite frequent discord between these two tests in 53% of the cases, a significant gain in exclusive diagnostic capability is realized when applied to a patient population anticipated to have a disease prevalence equal to the 67% encountered in this study. N B

A83-21067\* Maryland Univ., Baltimore

**DENERVATION AND REINNERVATION OF SKELETAL MUSCLE**

R. F. MAYER and S. R. MAX (Maryland University, Baltimore, MD) In Myasthenia gravis. London, Chapman and Hall, Ltd., 1983, p. 215-246. refs

(Contract NIH-NS-15760, NIH-NS-15766, NAG2-100)

A review is presented of the physiological and biochemical changes that occur in mammalian skeletal muscle after denervation and reinnervation. These changes are compared with those observed after altered motor function. Also considered is the nature of the trophic influence by which nerves control muscle properties. Topics examined include the membrane and contractile properties of denervated and reinnervated muscle, the cholinergic proteins, such as choline acetyltransferase, acetylcholinesterase, and the acetylcholine receptor, and glucose-6-phosphate dehydrogenase. N B

A83-21096#

**THE AUTOMATIC REPRESENTATION AND ESTIMATION OF THE DOMAINS OF PERCEPTION - AN APPLICATION TO THE EVALUATION OF VISUAL ACUITY [REPRESENTATION ET ESTIMATION AUTOMATIQUE DES DOMAINES DE PERCEPTION APPLICATION A L'EVALUATION DE L'ACUITE VISUELLE]**

E. TAQUET, Lille I, Université, Docteur (3e cycle) Thesis, 1981. 128 p. In French. refs

A method is developed for the evaluation of the parameters of the visual function. The physiology of vision is reviewed and several aspects of the evaluation of visual performance are examined. An interactive system consisting of a doctor, patient, and machine is formulated. An automatic procedure is developed which represents and sums the information obtained from the analysis of the patients' responses, as well as determines the choice of point-tests. The theory of fuzzy subsets is utilized in order to represent the domains of perception which originate from the sum of the patients' responses. The strategy of examination and the choice of the light stimuli are examined in detail. In addition, an example of the use of this method for determining visual acuity is given. N B

## A83-22776

THE STROKE AND MINUTE VOLUMES OF THE HEART, THE DEMAND FOR OXYGEN, AND THEIR CHANGES UNDER THE INFLUENCE OF PHYSICAL LOADS [UDARNYI, MINUTNYI VYBROS Y SERDTSA, POTREBLENIE KISLORODA I IKH IZMENENIE POD VLIANIEM FIZICHESKOI NAGRUZKI]

N M SHESTAKOV (Riazanski Meditsinski Institut, Ryazan, USSR) Fiziologiya Cheloveka, vol 9, Jan-Feb 1983, p 83-91 In Russian refs

A formula for calculating the stroke volume and the volume of the circulating blood is developed on the basis of rheographic measurements. Measurements of healthy individuals before and after bicycle ergometric tests show that when the body is in the vertical position, the minute volume increases primarily at the expense of the stroke volume, while in the horizontal position, the minute volume increases at the expense of a rise in the heart rate. These responses are due to the fact that in the horizontal position the stroke volume, even at rest, has the greatest value, which limits its further growth. During large loads, a decrease in the coefficient of oxygen consumption and the circulating blood volume are found, while the absorption of oxygen by 1 ml of blood and the effective circulation coefficient increase. NB

## A83-22777

THE DEPENDENCE OF THE DEVELOPMENT OF COMPLICATIONS IN PATIENTS WITH AN INFARCTION OF THE MYOCARDIUM AND CHRONIC ISCHEMIC HEART DISEASE ON THE STATE OF THE ELECTROMAGNETIC FIELD OF THE EARTH [ZAVISIMOST' RAZVITIYA OSLOZHNENIY U BOL'NYKH INFARKTOM MIOKARDA I KHONICHESKOI ISHEMICHESKOI BOLEZN'IU SERDTSA OT SOSTOYANIYA ELEKTROMAGNITNOGO POLIA ZEMLI]

G V RYZHIKOV, A P GOLIKOV, and V A GUMENIUK (Akademiya Meditsinskikh Nauk SSSR, Ministerstvo Zdravookhraneniya RSFSR, Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Moscow, USSR) Fiziologiya Cheloveka, vol 9, Jan-Feb 1983, p 98-102 In Russian refs

## A83-22778

THE CHARACTERISTICS OF THE CO<sub>2</sub> BALANCE DURING PHYSICAL LOADS IN HEALTHY UNTRAINED INDIVIDUALS [OB OSOBNOSTYAKH BALANSA CO<sub>2</sub> PRI FIZICHESKOI NAGRUZKE U ZDOROVYKH NETRENIROVANNYKH LIUDEI]

T A KHANLAROVA Fiziologiya Cheloveka, vol 9, Jan-Feb 1983, p 103-107 In Russian refs

## A83-22779

THE CONTENT OF WATER IN THE LUNGS OF A HEALTHY INDIVIDUAL [SODERZHANIE VODY V LEGKIKH ZDOROVOGO CHELOVEKA]

E M NIKOLAENKO (Ministerstvo Zdravookhraneniya SSSR, Nauchno-Issledovatel'skii Institut Transplantologii i Iskusstvennykh Organov, Moscow, USSR) Fiziologiya Cheloveka, vol 9, Jan-Feb 1983, p 108-113 In Russian refs

## A83-22951

INTERNATIONAL CONGRESS ON AEROSPACE MEDICINE, 29TH, NANCY, FRANCE, SEPTEMBER 7-11, 1981, SCIENTIFIC REPORTS [CONGRES INTERNATIONAL DE MEDECINE AERONAUTIQUE ET SPATIALE, 29TH, NANCY, FRANCE, SEPTEMBER 7-11, 1981, COMMUNICATIONS SCIENTIFIQUES] Congress sponsored by the Academie Internationale de Medecine Aeronautique et Spatiale and Societe Francaise de Physiologie et de Medecine Aeronautiques et Cosmonautiques. Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982 215 p In French and English

Topics concerning the selection and medical control of flight personnel, air transport sanitary evacuation, and hygiene and air transport are discussed, such as the high density lipoprotein finding in young airline pilots, postexercise blood pressure as a predictor of hypertension, disease risk factors, the detection of drug addiction among flight personnel, considerations on organizing sanitary air transport on long flights, and the carriage of the mentally

disordered. Also examined are topics relating to the hygiene of the ground personnel in charge of airspace security, acceleration and spatial disorientation, and physiological and spatial experimental medicine. These include studies of the psychological fitness of the ground personnel in charge of airspace security, problems raised by the medical fitness of airport firemen in charge of security services, fire, and rescue, spatial disorientation in the naval aviation environment, vertical optokinetic sensations induced by a limited stimulus of the peripheral vision field, central hemodynamics during stepwise increasing water immersion, and problems of psychoprophylaxis in prolonged manned space flights. NB

## A83-22952

WHAT IS TO BE THOUGHT OF INDUCED HYPERGLYCEMIA IN AVIATION MEDICINE IN 1981 [QUE FAUT-IL PENSER EN 1981 DES HYPERGLYCEMIES PROVOQUEES EN MEDECINE AERONAUTIQUE]

J KAFFER, R CARRE (Centre Principal d'Expertise Medicale du Personnel Navigant, Paris, France), D ESCANDE, C Y GUEZENNEC, and P C PESQUIES (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 253-255 In French

A successive series of four different tests of hyperglycemia induced by oral means (glucose tolerance tests) were given to 7 young adults between the ages of 20-25. The amount of glucose absorbed was 75 g. The technique utilized by the Centre Principal d'Expertise Medicale du Personnel Navigant was compared to three other techniques with different methods following the placement of a catheter in the vein to stop the functions of the venous repeat. One method utilized the conditions of metabolic search, another utilized exercise on a bicycle ergometer, and the third utilized an intellectual test. It was found that the glucose tolerance test used during medical evaluations is not sensitive to external conditions of testing. NB

## A83-22953

HIGH DENSITY LIPOPROTEIN /HDL/ FINDING IN YOUNG AIRLINE PATIENTS

W H KING, W L BRAWLEY, and R L WICK (American Airlines, Inc., Dallas, TX) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 256-261 refs

Various clinical and other factors are evaluated as determinates of the potential risk for coronary disease in over 900 successful candidates for employment as commercial airline pilots. Among the factors analyzed were the age of the pilots, systolic and diastolic blood pressures, smoking habits, weight, exercise habits, cholesterol, and high-density lipoproteins (HDL). In addition, the cholesterol/HDL ratio, the cholesterol/HDL ratio in groups by exercise habits, and the cholesterol/HDL ratio in groups by weight were determined. It is concluded that the cholesterol/HDL ratio is the most sensitive indicator for evaluating coronary risk, and is closely linked with body weight and exercise habits. NB

## A83-22954

BLOOD EOSINOPHILIA IN AVIATORS [EOSINOPHILIES SANGUINES CHEZ LES AVIATEURS]

M STOIAN and I NASTOIU Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 261-263 In French refs

The causes of the variation of the rate of eosinophilia considered as greater than normal (greater than 4 percent) were studied for a group of aviation pilots over the course of 16 years. A statistically significant annual variation in the percentage of eosinophilia was found for the group of pilots. The variations which are due to periodic, or intermittent, eosinophilia are determined by meteorological (barosensitive) factors, while allergic eosinophilia is determined by immunizations and by contact with pesticides. It is concluded that the significant positive correlation of true eosinophilia both with atmospheric pressure and with the years which precede solar activity suggests that other meteorological factors may play a role in the etiopathology of intermittent eosinophilia. NB

**A83-22956****A PRESENTATION OF A NEW PROTOCOL FOR THE EVALUATION OF COLOR SENSE IN AERONAUTICS [PRESENTATION D'UN NOUVEAU PROTOCOLE D'EVALUATION DU SENS COLORE EN AERONAUTIQUE]**

P J MANENT (Service de Sante des Armees, Paris, France), G LASSERRE, and A PON (Hopitaux des Armees, Clamart, Hauts-de-Seine, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 270-272 In French

A simple and rapid technique is developed for evaluating the color sense of aeronautical flight personnel. The pseudo-isochromatic atlas of Ishihara is used to determine normal color sense, and the chromoptometric lantern of Beyne is used to evaluate the abnormalities of color sense detected by the first test. It is found that the orientation of the chromoptometric lantern and the fixation of the subjects at the time of the identification of the colored lights are crucial to the accuracy of the technique.

N B

**A83-22958****THE PRESSURE PROBLEMS OF THE MIDDLE EAR IN FLIGHT PERSONNEL - THE IMPORTANCE OF IMPEDANCEMETRIC EXAMINATIONS [LES PROBLEMES TENSIONNELS DE L'OREILLE MOYENNE CHEZ LE PERSONNEL NAVIGANT - INTERET DES EXAMENS IMPEDANCEMETRIQUES]**

J P POURDIEU, J SOUDANT, and E LAFONTAINE (Compagnie Nationale Air France, Service Medical, Paris, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 275-277 In French

**A83-22959****GALL BLADDER DISEASE IN A 30 YEAR FOLLOW UP STUDY - ITS ASSOCIATION WITH ISCHEMIC DISEASE**

J GEGG, F A L MATHEWSON, D MYMIN, and R B TATE (Manitoba, University, Winnipeg, Canada) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 279-281. Research supported by the Department of National Health and Welfare, Great-West Life Assurance Co., Murphy Foundation, and Manitoba Medical Services Foundation. refs

**A83-22960****WOLF-PARKINSON-WHITE SYNDROME IN YOUNG, ASYMPTOMATIC PILOT'S APPLICANTS**

L A AMEZCUA, D PEREZ, A GOMEZ, and H CAHUANTZI (Direccion General de Aeronautica Civil, Centro Nacional de Medicina de Aviacion, Mexico City, Mexico) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 282, 283 refs

**A83-22961****EXTRASYSTOLES AND THE FITNESS OF FLIGHT PERSONNEL - THE CONTRIBUTION OF THE STRESS EKG TESTS [EXTRA-SYSTOLES ET APTITUDE AU PERSONNEL NAVIGANT /P.N./ - APPORT DE L'E.C.G. D'EFFORT]**

G LEGUAY, G JACOB, and A SEIGNEURIC (Hopital d'Instruction des Armees Dominique Larrey, Versailles, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 284-291 In French refs

The use of the stress EKG test for detecting and evaluating extrasystoles is examined using flight personnel as test subjects. It is shown that the stress EKG and the EKG tests are two complementary methods for determining the existence of extrasystoles. In tests on flight personnel, it was found that the stress EKG was superior to the EKG 19 times out of 59, while, conversely, the EKG was superior to the stress EKG 16 times out of 100. It is concluded that the stress EKG is a useful method for evaluating extrasystoles since it is able to indicate repolarization effects.

N B

**A83-22962****THE IMPORTANCE OF DETERMINING THE SYSTOLE TIMING OF THE LEFT VENTRICLE IN THE SELECTION OF FLIGHT PERSONNEL [LA VALEUR DE LA DETERMINATION DES TEMPS DE LA SYSTOLE DU VENTRICULE GAUCHE DANS LA SELECTION DU PERSONNEL AERONAVIGANT]**

T COSTIN, A POPESCU, I PINTILIE, and A NICOLAE (Centre de Medecine Aeronautique, Bucharest, Rumania) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 291, 292 In French

**A83-22963****DISEASE RISK FACTORS AND THE FLIGHT SURGEON - A STRATEGY TO KEEP PILOTS FLYING**

C A BERRY, M A BERRY, and A N BERRY (National Foundation for the Prevention of Disease, Houston, TX) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 292-296

A survey is presented of the various factors which contribute to the increased risk of several diseases, mainly heart disease and cancer. The risk factors discussed include age, sex, nutritional intake, smoking, exercise habits, blood pressure, and cholesterol levels. The effect of reducing the number of risk factors is examined for several large groups of individuals. It is proposed that evaluations of flight personnel begin well before the age of 45 in order to prevent the sharp increases in the frequency of cardiovascular disqualifications after age 45. In addition, it is suggested that the flight surgeon can actively work to reduce the risk of various diseases by educating pilots to understand the importance of risk factors and to help motivate them to reduce these risks and prolong their careers.

N B

**A83-22964****CARDIAC LOCALIZATIONS OF SARCOIDOSIS - THE IMPORTANCE OF THE CONTINUOUS ELECTROCARDIOGRAM [LES LOCALISATIONS CARDIAQUES DE LA SARCOIDOSE - INTERET DE L'ENREGISTREMENT CONTINU DE L'ELECTROCARDIOGRAMME]**

A SEIGNEURIC, G LEGUAY (Hopital d'Instruction des Armees Dominique Larrey, Versailles, France), P ALLARD, and J KERMAREC (Hopital d'Instruction des Armees Percy, Clamart, Hauts-de-Seine, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 297-300 In French refs

Methods for the diagnosis of sarcoid heart disease are examined, including continuous EKG, echocardiography, and scintigraphy. It is shown that the continuous EKG allows the identification of paroxysmic cardiac disorders in subjects having sarcoid heart disease. These abnormalities can be the only proof of pericardial or myocardial localizations. It is found that these abnormalities did not statistically occur more frequently in a group of flight personnel than in the general population.

N B

**A83-22965****THE DETECTION OF DRUG ADDICTION AMONG FLIGHT PERSONNEL [DEPISTAGE DES TOXICOMANIES AU SEIN DU PERSONNEL NAVIGANT]**

F H ZEBOUNI (Middle East Airlines Airliban, Beirut, Lebanon) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 301-303 In French refs

**A83-22966****AN EXPERIMENTAL STUDY OF THE ENCEPHALIC HEMODYNAMIC VARIATIONS CONNECTED WITH FLIGHT AND POSITION WITH RESPECT TO THE FLIGHT AXES ON ALOUETTE III IN A HEALTHY SUBJECT [ETUDE EXPERIMENTALE DES VARIATIONS HEMODYNAMIQUES ENCEPHALIQUES LIEES AU VOL ET A LA POSITION PAR RAPPORT A L'AXE DU VOL SUR ALOUETTE III CHEZ LE SUJET SAIN]**

D HOCHART, J C MARSON, P SCHERPEREEL (Service d'Aide Medicale Urgente, Lille, France), G CARETTE, and Y HOUDAS (Centre Hospitalier Universitaire, Lille, France) Medecine Aeronautique et Spatiale, vol 21, 4th Quarter, 1982, p 305-308 In French refs



**A83-22967**

**THE NUTRITIONAL AND MICROBIOLOGICAL ASPECTS OF THE ONBOARD MEAL FOR PILOTS OF INTERNATIONAL AIRLINES [ASPECTS NUTRITIONNELS ET MICROBIOLOGIQUES DU REPAS DE BORD DES PILOTES DES LIGNES AERIENNES INTERNATIONALES]**

S MECONI, A DIOTALLEVI, and M BOVA (Societa Aeroporti di Roma, Rome, Italy) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 345-350 In French refs

**A83-22968**

**A STUDY OF THE PHYSIOLOGICAL BEHAVIOR IN A REAL-WORLD SITUATION OF 70 FRONT LINE AIR TRAFFIC CONTROLLERS WITH REGARD TO THE NEUROVEGETATIVE, NEUROMUSCULAR, AND OPHTHALMOLOGIC MODIFICATIONS, AND ALERTNESS [ETUDE DU COMPORTEMENT PHYSIOLOGIQUE EN SITUATION REELLE D'ACTIVITE DE 70 PREMIERS CONTROLEURS EN ROUTE DE LA CIRCULATION AERIEENNE PORTANT SUR LES MODIFICATIONS NEURO-VEGETATIVES, NEURO-MUSCULAIRES, OPHTHALMOLOGIQUES ET SUR LA VIGILANCE]**

R NOLLAND (Direction Generale de l'Aviation Civile, Orly Aerogare, Val-de-Marne, France) and J COBY (Direction Generale de l'Aviation Civile, Paris, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 355-363 In French

**A83-22969**

**ANALYSIS OF CONTINUOUS ELECTROCARDIOGRAPHIC TRACING OF AIR TRAFFIC CONTROLLERS RECORDED DURING WORK**

S KUSIC, J PFAF, and R PODJANIN (Jugoslovenski Aerotransport, Belgrade, Yugoslavia) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 363-365

**A83-22971**

**A PRELIMINARY STUDY USING SURFACE ELECTROMYOGRAPHY OF THE BEHAVIOR OF AIR TRAFFIC CONTROLLERS ACCORDING TO THE DENSITY OF TRAFFIC [ETUDE PRELIMINAIRE, PAR ELECTROMYOGRAPHIE DE SURFACE, DU COMPORTEMENT DU CONTROLEUR DU TRAFIC AERIEEN SELON LA DENSITE DU TRAFIC]**

R K L ERFMANN (Direction Generale de l'Aviation Civile, Orly Aerogare, Val-de-Marne, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 370-372 In French refs

**A83-22972**

**REMARKS ON THE SYSTEMATIC TONAL AUDIOMETRY OF THE GROUND PERSONNEL IN CHARGE OF AIRSPACE SECURITY [REFLEXIONS SUR L'AUDIOMETRIE TONALE SYSTEMATIQUE CHEZ LE PERSONNEL AU SOL CHARGE DE LA SECURITE AERIEENNE]**

P LAVANANT (Direction Generale de l'Aviation Civile, Plougastel Daoulas, Finistere, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 376-380 In French

**A83-22973**

**SPINAL TRAUMAS /DORSAL SPINAL FRACTURES AND LUMBAR DISK HERNIAS/ OCCURRING AFTER RAPID VIBRATORY PHENOMENA /PUMPING/ IN AIR COMBAT PILOTS [LES TRAUMATISMES RACHIDIENS /FRACTURES DU RACHIS DORSAL ET HERNIES DISCALES LOMBAIRES/ SURVENANT APRES PHENOMENES VIBRATOIRES RAPIDES /POMPAGES/ CHEZ LES PILOTES D'AVIONS DE COMBAT]**

R P DELAHAYE and R AUFFRET (Service de Sante des Armees, Paris, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 381-386 In French

The causes and the effects of the phenomena of pumping (rapid vibrations) are evaluated for 21 cases which occurred in high-speed combat aircraft. The statistical distribution of the damages to the spinal column and lumbar disks is presented for the 21 pilots studied. Several of these cases of pumping are analyzed in detail. The different methods of the treatment of the

spinal injuries and lumbar disk hernias resulting from pumping are also examined, including methods of physiotherapy N B

**A83-22974**

**SOME CONSIDERATIONS ON LUMBAR PAINS AND DISEASES OF THE INTERVERTEBRAL DISK TO CIVILIAN AIRCREWMEN S GALIANI, C CRISTESCU, L MARINESCU, and P NICULESCU (Centre of Aviation Medicine, Bucharest, Rumania) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 387-389 refs**

**A83-22975**

**SOME OBSERVATIONS ON BAIL OUT INJURIES**

N H HASSAN *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 390, 391

An evaluation is presented of the injuries sustained by Egyptian pilots during bail out during the October 1973 war. It was found that 60 percent of the cases had spinal column injuries, while 40 percent had injuries to limb bones, mainly in the upper limbs. The specific types of these injuries are detailed and the methods of treatment described. Among other findings, it is shown that all fractures were stable wedge, compression of the kyphotic dorsal spine, or a stable burst of the lumbar vertebrae. Fractures of the os calcis were not associated with spinal fractures. All pilots who injured their spine felt the back pain at the moment of ejection and not on landing, while limb injuries were experienced in the air. It is concluded that bail out injuries are sustained at the ejection seat level and are preventable by proper adherence to ejection rules, the use of seat cushions, the proper tightening of straps, the positioning of limbs, physical training, and regular training sessions at the ejection tower N B

**A83-22977**

**A NEW TECHNIQUE OF STUDYING THE EFFECTS OF VIBRATIONS ON THE SPINE [NOUVELLE METHODE D'ETUDE DES EFFETS DES VIBRATIONS SUR LA COLONNE VERTEBRALE]**

P QUANDIEU and P BORREDON (Laboratoire Central de Biologie Aerospatiale, Paris, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 397-405 In French refs

A transfer function is defined for the propagation of a vibratory wave between two adjacent vertebra. The signal received by the adjacent vertebra is modelled as the output of the intercalary disk. The Fourier transformation was used as a particular case of the Laplacian transformation, and the disk was considered as a mechanical filter. An experiment is described in which a seated primate, fitted with accelerometers connected to two contiguous vertebra, was subjected to vertical vibrations to obtain measurements of the behavior of the disk system as a function of vibratory frequency. It was found that the spinal disks acted as a low-pass filter operating in a linear mode. The muscular activity around the spine modified the transfer characteristics of the disks. High frequencies passed less readily than did low frequency vibrations, although a relaxation on the paravertebral muscles (induced by drugs) caused a shift to transmission of higher frequency vibrations M S K

**A83-22978**

**THE EFFECT OF LOW FREQUENCY VIBRATIONS ON THE HUMAN CARDIO-CIRCULATORY SYSTEM - A MEASUREMENT TECHNIQUE AND RESULTS FOR AN 18 HZ SINUSOIDAL VIBRATION [EFFETS DES VIBRATIONS DE BASSE FREQUENCE SUR LE SYSTEME CARDIOCIRCULATOIRE CHEZ L'HOMME - TECHNIQUE DE MESURE ET RESULTATS POUR UNE VIBRATION SINUSOIALE DE 18 HZ]**

J L POIRIER and J M CLERE (Centre d'Essais en Vol, Bretigny-sur-Orge, Essonne, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 405-409 In French

Plethysmographic monitoring was performed before, during, and after the exposure of male subjects to 18 Hz vertical vibrations while on a table. The excursions lasted for one and a half hours, and imparted accelerations of 0.1-0.2, and 0.3 g on the subjects. A global depression of the total cardiac flow rate was detected,

and reached a maximum of 18 percent by the end of the test. A drop was also present in the volume systolic rejection, the cerebral circulation, and the systolic pressure. The values all returned to normal either immediately or shortly after the vibrations ceased. It is suggested the blood was stored at the pulmonary level, thereby lowering the amount in the left cardiac chamber and causing a reduction in the systolic pressure. The venous return to the left chamber could be augmented or restricted by a peripheral vasoconstriction which raised the diastolic pressure. The results of the tests are considered useful toward the establishment of standards for human tolerance of vibration. M S K

#### A83-22979

##### **SPATIAL DISORIENTATION IN THE NAVAL AVIATION ENVIRONMENT**

V M VOGUE (U.S. Navy, Naval Safety Center, Norfolk, VA) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 409-414 refs

The problems of vertigo and spatial disorientation encountered by military pilots are examined. The different physiological causes of these two types of problems are analyzed in detail, focusing on the cochlear disturbances which give rise to vertigo and on the ocular illusions which give rise to spatial disorientation. Several different types of vertigo are discussed, including the coriolis effect, the 'leans', the 'graveyard spin', and somatogravic, somatogyral, and elevator illusions. Various types of spatial disorientation are also considered, including the oculogravic illusion, nystagmus, target fixation, and the autokinetic illusion. Specific examples of these different problems encountered by naval pilots are presented. N B

#### A83-22980

##### **VERTICAL OPTOKINETIC SENSATIONS CAUSED BY A STIMULATION LIMITED TO THE PERIPHERAL VISUAL FIELD [LES SENSATIONS OPTOCINETIQUES VERTICALES CAUSEES PAR UNE STIMULATION LIMITEE DU CHAMP VISUEL PERIPHERIQUE]**

J HULK (Centre National de Medecine Aeronautique et Spatiale, Soesterberg, Netherlands) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 414-419. In French refs

An experiment for eliciting sensations of vertical movement by means of the presentation of visual images suggesting vertical motion at the periphery of vision is described. A CRT display presents highly contrasted bar patterns in black and white moving vertically. The subject peers through a mask in front of the screen, and is exposed to a visual field that can be altered by half-degrees in the angular horizontal and vertical directions. During the trials, the subjects viewed the screen one eye at a time, and the display began in the center of the screen and was moved outward, stopping at 10-60 deg locations in 10 deg increments. Different rates of change and speeds of the vertically moving lines were explored for effect. The dimensions of the objects affected the lift perceptions only if their angular speeds were moderated. Increasing the mask size produced the same sensation as increasing the bar sizes. The best results were obtained at angles of 50-60 deg, and were optimized between 10-15 deg per sec in terms of the upward movement of the bars. It is noted that an inclination from the vertical was perceived at low intensities. M S K

#### A83-22982

##### **HYDRO-ELECTROLYTIC AND HORMONAL MODIFICATIONS LINKED TO EXTENDED DECUBITUS IN AN ANTIORTHOSTATIC POSITION [MODIFICATIONS HYDRO-ELECTROLYTIQUES ET HORMONALES LIEES AU DECUBITUS PROLONGE EN POSITION ANTI-ORTHOSTATIQUE]**

A GUELL, M BARRERE, J C COLOMBANI, A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France), and C L. GHARRIB (Lyon I, Universite, Lyon, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 425-427. In French refs

#### A83-22983

##### **THE EFFECTS OF CLONIDINE ON THE MODIFICATIONS IN THE SYSTOLIC TIME INTERVALS INDUCED BY EXTENDED DECUBITUS IN AN ANTIORTHOSTATIC POSITION [EFFETS DE LA CLONIDINE SUR LES MODIFICATIONS DES INTERVALLES DE TEMPS SYSTOLIQUES INDUITES PAR LE DECUBITUS PROLONGE EN POSITION ANTI-ORTHOSTATIQUE]**

J COLIN, J TIMBAL (Service de Sante pour l'Armee de l'Air, Ecole d'Application, Paris, France), and A GUELL (Centre Hospitalier Universitaire Rangueil, Toulouse, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 428-433. In French refs

The effectiveness of clonidine, an alphasymphathomimetic derivative, for suppressing the sympathetic nervous system response to weightlessness, was examined. The particular feature of interest was the tendency for the modification of blood pressure which occurs in low-gravity environments, leading to a lowering of blood pressure in the legs. Six subjects were placed in a supine position, where they remained for a week. Three of the subjects were administered a 0.450 mg daily dose of clonidine. The systolic rhythms were monitored by plethysmography, and further data were obtained by electrocardiography. The Gauer-Henry reflex was observed among the group without the clonidine, and was absent among those who had been given the drug. The orthostatic changes were not, however, eliminated, although they were reduced, and it is concluded that the elimination of changes in the blood plasma volume are only secondary effects in the problem of orthostatic tolerance to zero-g. M S K

#### A83-22984

##### **CENTRAL HEMODYNAMICS DURING STEPWISE INCREASING WATER IMMERSION**

H LOELLGEN, K KOPPENHAGEN, G V NIEDING, T BONZEL, and S JOHN (Freiburg, Universitat, Freiburg im Breisgau, Berlin, Universitat, Deutsche Gesellschaft fur Luft- und Raumfahrt, Berlin, West Germany) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 436, 437

The significance of the water level on the circulatory response to immersion is investigated by analyzing the central hemodynamics and the left ventricular function during graded immersion. Results show that the left ventricular function during stepwise increasing water immersion remains in the normal range or is even improved with a rise in cardiac output and in ejection fraction. In addition, the hydrostatic pressure on the capacitance vessels during immersion is found to be the predominant mechanism inducing cardiovascular changes during immersion. N B

#### A83-22985

##### **ELECTRONYSTAGMOGRAPHY IN SPACE**

U BRANDT (Swedish Air Force, Stockholm, Sweden) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 438, 439 refs

Practical and theoretical aspects about the function of the vestibular system are discussed in the light of the preparation of the Spacelab research program. Topics discussed include the central nervous system mechanisms involved in space motion sickness and the effect of gravity loading on the cupulo-endolymph system. Also examined are the effect of weightless conditions on caloric nystagmus and the use of electronystagmography for monitoring humans in space, as well as the limitations of this technique. N B

#### A83-22987

##### **DEVELOPMENT OF COUNTERMEASURES AGAINST ADVERSE EFFECTS OF WEIGHTLESSNESS ON THE HUMAN BODY**

L I KAKURIN, A I GRIGOREV, V M MIKHAILOV, I U A SENKEVICH, and V A TISHLER (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 443-446 refs

A review is presented concerning investigations of various regimes to counter the negative effects of weightlessness on the human body. The efficiency of various countermeasures is

compared, including physical exercises, muscle electrostimulation, lower body negative pressure, drugs, resonance vibration with a mechanical effect frequency, hypoxic and helium-oxygen mixtures, and controlled intakes of food, water, and salt. It is concluded on the basis of comparative simulation experiments that the most efficient type of countermeasure is physical exercise. However, no single type of countermeasure can assure a complete protective effect and specially selected combinations of countermeasures and regimes must be utilized in order to increase the protective effect. A regime of various countermeasures is proposed based on the results of these investigations. N B

**A83-22988****MULTIPLE HORMONAL CHANGES DURING WATER IMMERSION - AN ANALOG OF WEIGHTLESSNESS**

G BRUSCHI, P CORUZZI, L MUSIARI, C RAVANETTI, M E BRUSCHI, A NOVARINI, and A BORGHETTI (Parma, Università, Parma, Italy) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 446-448 refs

The effects of head-out water immersion, an analog of weightlessness, on the endocrine system is investigated in humans. A two hour period of water immersion is found to result in a 72 percent fall in the activity of plasma renin, a 45 percent decrease in plasma aldosterone, and a 35 percent and a 58 percent decrease of C-PTH and N-PTH, respectively. ACTH and cortisol decrease by 35 percent and 45 percent, respectively, while the amount of prolactin decreases by 29 percent. However, the amount of growth hormone increases by 318 percent. Possible explanations for these changes are examined, including the redistribution of blood volume during head-out water immersion. N B

**A83-23022****AN INVESTIGATION OF HUMAN BLOOD, ERYTHROCYTES, AND PLASMA USING THE METHOD OF ESR AT 77 K [ISSLEDOVANIYE KROVI CHELOVEKA, ERITROTSITOV I PLAZMY METODOM EPR PRI 77 K]**

R G SAIFUTDINOV and K R SEDOV (Irkutskii Gosudarstvennyi Meditsinskii Institut, Irkutsk, USSR) *Biofizika*, vol 28, Jan-Feb 1983, p 87-91. In Russian refs

The method of electron spin resonance (ESR) was utilized to study the characteristics of the free radicals in human blood, erythrocytes, and plasma at 77 K. Results show that the ESR signal in the erythrocytes and blood with g approximately equal to 20030-20040 and Delta H approximately equal to 955-1190 A/m refers to flavinsemiquinone, a coenzyme of glutathione reductase. The ESR signal in the plasma with g approximately 20024-20029 and Delta H approximately equal to 480-640 A/m refers to ions of polycyclic hydrocarbons. It is suggested that ESR methods could be used as a diagnostic tool for investigations of the pathological processes in patients with metabolic disorders. N B

**A83-23145****EFFECTS OF PRACTICE AND THE SEPARATION OF TEST TARGETS ON FOVEAL AND PERIPHERAL STEREOACUITY**

M FENDICK and G WESTHEIMER (California, University, Berkeley, CA) *Vision Research*, vol 23, no 2, 1983, p 145-150 refs

(Contract NIH-EY-00220)

The improvement in stereoacuity of two inexperienced, normal subjects is compared at foveal and at 2.5 deg and 5 deg peripheral target locations as a function of practice. Outlines of two squares differing only in binocular disparity are used as test stimuli, and estimates of stereoacuity are obtained by application of the method of constant stimuli with feedback. The peripheral thresholds of both subjects are found to improve 60-80% over the course of the first 3000-4000 responses at each stimulus location. Foveal improvement follows an identical time-course, with a 73% improvement in one subject and only 23% in the other. This difference, which is reflected in the peripheral/foveal threshold ratios of the two subjects, underlines the necessity of ensuring the stability of thresholds. Stereoacuity measurements are also obtained using several different square separations at the fovea and at 2.5 deg, 5 deg, and 10 deg peripheral locations along the

horizontal and vertical retinal meridians of two other normal subjects. Practice-stabilized disparity thresholds using optimal target separations reveal a steeper deterioration between the fovea and 2.5-5 deg eccentricities than did measurements of the same subjects' minimum angles of resolution. C R

**A83-23146****SEPARATE MOTION AFTEREFFECTS FROM EACH EYE AND FROM BOTH EYES**

S ANSTIS and K DUNCAN (York University, Downsview, Canada) *Vision Research*, vol 23, no 2, 1983, p 161-169. Research supported by the Smith-Kettlewell Eye Research Foundation, Natural Sciences and Engineering Research Council of Canada refs

(Contract NSERC-A-0260)

Monocular and binocular motion aftereffects (MAEs) contingent upon which eye (or eyes) is exposed to the adapting motion are described. The subjects view the clockwise rotation of a patterned disk with their left eye, alternating every 5 sec with anticlockwise rotation seen with their right eye, for a 10-min adapting period. The result is that they see an anticlockwise motion aftereffect with their left eye and a clockwise MAE with their right eye. Lasting only 2-20 sec, these monocular MAEs can be elicited repeatedly over a 2-6 min period and can be elicited again 2 hours later. In a second experiment, subjects adapt for 10 min to the following cycle of 5-sec rotations: left eye, clockwise; right eye, clockwise; and both eyes together, anticlockwise. The result is that they see an anticlockwise MAE with their left eye only or with their right eye only and a clockwise MAE when both eyes are open. A model is proposed for monocular and binocular inputs to motion-sensitive neural channels. C R

**N83-17052\*** National Aeronautics and Space Administration, Washington, D C

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 239, DECEMBER 1982**

Dec 1982 102 p

(NASA-SP-7011(239), NAS 1 21 7011(239)) Avail NTIS HC

A06 CSCL 06E

This bibliography lists 318 reports, articles and other documents introduced into the NASA scientific and technical information system in November 1982. Author

**N83-17053\*#** National Aeronautics and Space Administration, Washington, D C

**INVESTIGATION OF THE VASCULAR REACTION OF THE NASAL MUCOSA IN COSMONAUTS**

I Y YAKOVLEVA and V P BARANOVA Dec 1982 7 p refs. Transl into ENGLISH from *Vest Otorinolaringologii* (USSR), no 5, Sep - Oct 1982 p 44-46. Transl by Kanner (Leo) Associates, Redwood City, Calif. Original doc prep by Inst of Biomedical Problems, USSR Ministry of Public Health, Moscow

(Contract NASW-3541)

(NASA-TM-77180, NAS 1 15 77180) Avail NTIS HC A02/MF

A01 CSCL 06P

Rhinopneumometric examinations in 3 positions of the body were undertaken in 36 cosmonauts aged 25 to 45 years, 14 of whom participated in space flights of various lengths. The nasal vascular response standards were defined in persons of the group examined. A subjective characteristic of the nasal vascular reactions arising during the flight is provided. Examinations of 14 people were performed before and after the space flight. The rise of intranasal resistance in the horizontal body position permits forecasting different degrees of nasal breathing disturbances during a period of acute adaptation to weightlessness owing to vasomotor alterations of the nasal mucous membrane. Author

**N83-17054\*#** National Aeronautics and Space Administration, Washington, D C

**THE INFLUENCE OF MOTOR ACTIVITY ON THE DEVELOPMENT OF CARDIAC ARRHYTHMIAS DURING EXPERIMENTAL EMOTIONAL STRESS**

L S ULYANINSKIY, T G URMACHEYEVA, Y P STEPANYAN, A A FUFACHEVA, A V GRITSAK, B A KUZNETSOVA, and A A KVIKA Oct 1982 12 p refs Transl into ENGLISH from Kardiologiya (USSR), no 10, Oct 1981 p 64-67 Transl by Scientific Translation Service, Santa Barbara, Calif Original doc prep by Academy of Medical Sciences, Moscow

(Contract NASW-3542)  
(NASA-TM-77162, NAS 1 15 77162) Avail NTIS HC A02/MF A01 CSCL 06S

Experimental emotional stress which can produce various disorders of cardiac rhythm sinus tachycardia, atrial fibrillation, ventricular, extrasystoles and paroxysmal ventricular tachysystoles was studied In these conditions the adrenalin content in the blood and myocardium is increased 3 to 4 times It is found that moderate motor activity leads to a relative decrease of adrenalin in the myocardium and arrest of cardiac arrhythmias E A K

**N83-17055\*#** Technology, Inc, Houston, Tex Life Sciences Div

**NEUROPHYSIOLOGICAL RESPONSES TO STRESSFUL MOTION AND ANTI-MOTION SICKNESS DRUGS AS MEDIATED BY THE LIMBIC SYSTEM**

R L KOHL and S ODELL 12 Nov 1982 74 p refs  
(Contract NAS9-14880)

(NASA-CR-167776, NAS 1 26 167776) Avail NTIS HC A04/MF A01 CSCL 06S

Performance is characterized in terms of attention and memory, categorizing extrinsic mechanism mediated by ACTH, norepinephrine and dopamine, and intrinsic mechanisms as cholinergic The cholinergic role in memory and performance was viewed from within the limbic system and related to volitional influences of frontal cortical afferents and behavioral responses of hypothalamic and reticular system efferents The inhibitory influence of the hippocampus on the autonomic and hormonal responses mediated through the hypothalamus, pituitary, and brain stem are correlated with the actions of such anti-motion sickness drugs as scopolamine and amphetamine These drugs appear to exert their effects on motion sickness symptomatology through diverse though synergistic neurochemical mechanisms involving the septohippocampal pathway and other limbic system structures The particular impact of the limbic system on an animal's behavioral and hormonal responses to stress is influenced by ACTH, cortisol, scopolamine, and amphetamine Author

**N83-17056\*#** Bolt, Beranek, and Newman, Inc, Cambridge, Mass

**PSYCHOLOGICAL CORRELATES OF MENTAL WORKLOAD Final Report**

G L ZACHARIAS Feb 1980 116 p refs

(Contract NAS1-15192)

(NASA-CR-166054, NAS 1 26 166054, BBN-4308) Avail NTIS HC A06/MF A01 CSCL 06P

A literature review was conducted to assess the basis of and techniques for physiological assessment of mental workload The study findings reviewed had shortcomings involving one or more of the following basic problems (1) physiologic arousal can be easily driven by nonworkload factors, confounding any proposed metric, (2) the profound absence of underlying physiologic models has promulgated a multiplicity of seemingly arbitrary signal processing techniques, (3) the unspecified multidimensional nature of physiological 'state' has given rise to a broad spectrum of competing noncommensurate metrics, and (4) the lack of an adequate definition of workload compels physiologic correlations to suffer either from the vagueness of implicit workload measures or from the variance of explicit subjective assessments Using specific studies as examples, two basic signal processing/data reduction techniques in current use, time and ensemble averaging are discussed Author

**N83-17057\*#** Massachusetts Inst of Tech, Cambridge Man Vehicle Lab

**A HEURISTIC MATHEMATICAL MODEL FOR THE DYNAMICS OF SENSORY CONFLICT AND MOTION SICKNESS**

C M OMAN 1982 48 p refs

(Contract NAS9-15343, NCC9-1, NSG-2032)

(NASA-CR-169766, NAS 1 26 169766, A-O-L-SUP-392) Avail NTIS HC A03/MF A01 CSCL 06S

By consideration of the information processing task faced by the central nervous system in estimating body spatial orientation and in controlling active body movement using an internal model referenced control strategy, a mathematical model for sensory conflict generation is developed The model postulates a major dynamic functional role for sensory conflict signals in movement control, as well as in sensory-motor adaptation It accounts for the role of active movement in creating motion sickness symptoms in some experimental circumstance, and in alleviating them in others The relationship between motion sickness produced by sensory rearrangement and that resulting from external motion disturbances is explicitly defined A nonlinear conflict averaging model is proposed which describes dynamic aspects of experimentally observed subjective discomfort sensation, and suggests resulting behaviours The model admits several possibilities for adaptive mechanisms which do not involve internal model updating Further systematic efforts to experimentally refine and validate the model are indicated Author

**N83-17058#** Illinois Univ, Urbana  
**COMPUTER AUTOMATION OF THE THERMAL PULSE TECHNIQUE FOR LOCAL BLOOD FLOW MEASUREMENTS M.S. Thesis**

K L BAUM 1982 79 p refs

(AD-A119041, AFIT-CI-NR-82-45T) Avail NTIS HC A05/MF A01 CSCL 06P

Tissue blood perfusion is a fundamental measurement in physiology that affects the entire spectrum of medical practice and research A new and innovative method is under development by Dr Kenneth R Holmes and Dr Michael M Chen at the University of Illinois Their thermal pulse-decay method utilizes a small thermistor to pulse heat the tissue under study The thermistor is then used to record tissue temperature as the heat dissipates due to thermal conductivity and blood perfusion From this cooling data, local blood perfusion can be calculated by various computer routines The process of initiating and controlling the experiment, acquiring and storing the data, and calculating perfusion parameters has been computer automated The system is based on a Digital Equipment Corporation LSI 11 minicomputer The software package developed for the system is user oriented It can control up to six probes at once, performing both heating and measurement tasks The user is free to choose the duration of the heat pulses, as well as the sampling rate and sampling duration after the heat pulse The program automatically generates a data file for each active probe GRA

**N83-17059#** Vanderbilt Univ, Nashville, Tenn Dept of Psychology

**DEPTH CONSTANCY IN STEREOSCOPIC AFTERIMAGES: EFFECTS OF VIEWING DISTANCE AND MEASUREMENT METHOD**

R H CORMACK Aug 1982 35 p refs

(Contract N00014-81-C-0001, RR04209020)

(AD-A118970, N14-0001-82C-0003) Avail NTIS HC A03/MF A01 CSCL 05J

Stereoscopic depth constancy refers to the proposition that perceived depth signaled by retinal disparity remains constant despite changes in viewing distance There has been some controversy as to whether stereoscopic depth constancy can operate at distance greater than a few meters A previous study used a stereoscopic afterimage technique to determine whether depth constancy holds as fixation distance varies After obtaining an afterimage containing depth information in the form of retinal disparity, observers set a depth probe equal in apparent distance to the disparate afterimage The results showed that depth

constancy persisted up to 27 meters. The present study was conducted to address two issues raised by the previous work. First, it is important to establish that stereoscopic depth constancy can be confirmed by measures which do not themselves depend on retinal disparity as the depth probe method does. Second, it is only beyond 27 meters of viewing distance that there are large departures in the predictions made by different models of depth constancy. GRA

**N83-17060#** Massachusetts General Hospital, Boston  
**THE ROLE OF HIGH PRESSURE AND INERT GASES IN THE PRODUCTION AND REVERSAL OF THE HIGH PRESSURE NEUROLOGICAL SYNDROME** Final Report, 1 Apr. 1978 - 31 Mar. 1982

K W MILLER 6 Aug 1982 134 p refs  
(Contract N00014-75-C-0727)

(AD-A118923) Avail NTIS HC A07/MF A01 CSCL 06P

The ability of narcotic or anesthetic gases when added to oxy-helium breathing mixtures (trimix) to increase the depth limit imposed by the high pressure neurological syndrome (HPNS) has been investigated. Five such gases all gave good protection with potencies related to their anesthetic potencies. A large extension of the safe diving limits can be achieved, but finally a point is reached when the HPNS can only be a further postponed by adding anesthetic levels of the second inert gas. Thus, there now exists a trimix barrier to yet deeper diving. The gas mixtures required to prevent the HPNS can be calculated using as simple model of their mechanism of action called the critical volume hypothesis. These and further studies indicate that the several phases of the HPNS have separate etiologies and it is possible to selectively modify with drugs each of these end points. Neurochemical studies show promise of providing a deeper understanding of the underlying mechanisms. Author (GRA)

**N83-17061#** California Univ, Livermore Lawrence Livermore Lab

**STATUS OF MEASUREMENTS FOR RADIATION PROTECTION**

G A ARMANTROUT 4 Dec 1981 20 p refs  
(Contract W-7405-ENG-48)

(DE82-006180, UCID-19117) Avail NTIS HC A02/MF A01

The Dose Equivalent Index (DEI) was proposed as a dosimetric standard. The impact of the change on health physics instrumentation measurements was considered and the probable errors of representative instruments for measuring the DEI were evaluated. Little change is found from earlier slab standards. A more important consideration is the appropriateness of the use of the DEI as a dosimetric standard. The DEI may be satisfactory from a conservative viewpoint, but is not necessarily proportional to the true radiological risks involved. An alternate parameter (such as the 1 cm depth dose equivalent for an isotropically irradiated 30 cm sphere as suggested by Kramer) may be more appropriate. DOE

**N83-17062#** Aberdeen Univ (Scotland)

**DOSIMETRIC CONSIDERATIONS IN NEUTRON ACTIVATION ANALYSIS IN VIVO**

K V ETtinger, R G FAIRCHILD (Brookhaven National Lab), and S H COHN (Brookhaven National Lab) 1981 19 p refs  
Presented at the 4th Symp on Neutron Dosimetry, Munich-Neuherberg, West Germany, 1-5 Jun 1981

(Contract DE-AC02-76CH-00016)

(DE82-004700, BNL-30393, CONF-810673-5) Avail NTIS HC A02/MF A01

The use of filtered low energy neutron beams from reactors and isotopic sources opens new possibilities for detection of trace elements, particularly in the brain. The low values of kerma/neutron in 24 and 2 KeV beams, together with a relatively small value of quality factor made it possible to utilize these for detection of Ca in skull with a negligible dose administered to the patient. Furthermore, for an acceptable radiation dose to the brain and satisfactory eye sparing the levels of mercury in brain can be determined using prompt gamma ray technique at much lower concentrations than in the past. The tailoring of neutron spectrum

is finding applications in the detection of calcium in parts of the skeleton, close to the skin. For this and similar applications filtered beams offer better detectability, i.e., dose to the patient. Dose sparing is also achieved if Cf252 replaces Am-Be and Pu-Be sources. DOE

**N83-17063#** Oak Ridge National Lab, Tenn Industrial Safety and Applied Health Physics Div

**THE EFFECTS OF LOW LEVELS OF RADIATION ON HUMANS**

J A AUXIER 1981 16 p refs Presented at the 3rd Natl Congr of the Natl Assoc of Tech of Med Radiology, Panama City, 5 Nov 1981

(Contract W-7405-ENG-26)

(DE82-004108, CONF-811155-1) Avail NTIS HC A02/MF A01

The state of knowledge on effects of low-level ionizing radiations on humans is reviewed. Several problems relating to dose thresholds or lack of thresholds for several types of cancer and high linear energy transfer (LET) raditions and the effects of fractionation and dose protection are discussed. DOE

**N83-17064#** Pacific Northwest Lab, Richland, Wash

**IN VIVO MEASUREMENT OF AMERICIUM-241 IN AN ACCIDENTALLY EXPOSED SUBJECT**

H E PALMER, G A RIEKST, and E E ICAYAN (Hanford Environmental Health Foundation) Oct 1981 38 p refs  
Presented at the Intern Meeting on the Radiobiol of Radium and Actinides in Man, Lake Geneva, Wis, 12 Oct 1981

(Contract DE-AC06-76RL-01830)

(DE82-004319, PNL-SA-7471, CONF-8110126-1) Avail NTIS HC A03/MF A01

Detailed external measurements were made of internally deposited Am241 in a nuclear chemical operator involved in an americium exposure accident at the Hanford plant. Despite some interference from high-level external contamination, quantitative measurements of the Am241 content in the lung, liver, and bones were made starting on the third day after the accident. The rate of excretion of Am241 from these organs was determined. The Am241 embedded in the skin of the face and head was carefully mapped. The distribution over the total length of the body was also determined. Linear and rectilinear scanners, gamma cameras, large and small scintillation detectors, proportional counters, and Si(Li) and intrinsic germanium detectors were used to evaluate the internal deposition. Methods of calibration for quantitative measurement included simulation of the Am241 activity in both phantom and cadaver parts. DOE

**N83-17065#** Oak Ridge National Lab, Tenn Health and Safety Div

**NUCLEAR MEDICINE TECHNOLOGY Progress Report, quarter ending 30 Jun. 1981**

F F KNAPP, JR Dec 1981 25 p refs

(Contract W-7405-ENG-26)

(DE82-005997, ORNL/TM-7918) Avail NTIS HC A02/MF A01

The production of 191Os for 191Os-/sup 191m/Ir generator by irradiation of natural osmium was assessed because of limited supplies of enriched 190Os. The distribution of radionuclide products was determined after a 14 day irradiation of natural osmium in the High Flux Isotope Reactor (HFIR) to evaluate the potential usefulness of this method of 191Os production in comparison to irradiation of 97.8% enriched 191Os. It is indicated that neutron irradiation of natural osmium is impractical for production of 191Os for clinical use and that irradiation of enriched 190Os is the preferred production mode. A new tellurium fatty acid was prepared and evaluated in rats in which radioiodine (131I) was chemically stabilized on the molecule as a vinyl iodide. The absolute heart uptake was only marginal, however, which suggest that this particular vinyl iodide telluride fatty acid does not show high heart specificity. GRA

**N83-17066#** Oak Ridge National Lab, Tenn Chemical Effects Information Center.

**CHEMICALS IN IDENTIFIED HUMAN BIOLOGICAL MEDIA: A DATA BASE Annual Report**

M V CONE, comp, M F BALDAUF, comp, and F M MARTIN, comp Oct 1981 513 p refs  
(Contract W-7405-ENG-26)  
(DE82-007120, ORNL/EIS-163-VOL-1-PT-2,  
EPA-560/5-81-008A-VOL-3-PT-2, AR-3) Avail NTIS HC A22/MF A01

The data base in tabular format is provided. There are two sections, the first with records on nondrug substances, and the second with records on drugs. Chemicals in each section are arranged alphabetically by CAS preferred name, CAS registry number, formula, atomic weight, melting point, boiling point, and vapor pressure. Tissues are listed alphabetically with exposure route, analytical method, number of cases, range, and mean, when available in the source document. A variety of information may also be included that is pertinent to the range and mean as well as experimental design, demography, health effects, pathology, morphology, and toxicity. Review articles are included in the data base, however, no data have been extracted from such documents because the original research articles are included. DOE

**N83-17067#** Oak Ridge National Lab, Tenn  
**DEVELOPMENT OF STATISTICAL DATABASES FOR TOXICOLOGICAL STUDIES**

K L DANIELS and J GOYERT 1981 23 p refs Presented at the Workshop on Statist Databases for Toxicol Studies, Menlo Park, Calif, 2 Dec 1981  
(Contract W-7405-ENG-26)  
(DE82-005196, CONF-811208-3) Avail NTIS HC A02/MF A01

Methods for assessing the effects of coal derived synthetic fuels on the aquatic environment are discussed. An approach is presented that was used to develop and implement a statistical data base for analyzing these effects. Fifty-four separate acute bioassay tests were conducted by six investigators using nine species, six compounds, and multiple exposure concentrations/compound with three to five replicates per exposure concentration/compound. Organisms from each species were exposed to several concentrations of each compound and a response was noted. The Statistical Analysis System (SAS) software package running under IBM's Virtual System in a time share option environment was used from data base management, statistical analysis, and graphical display. Partitioned raw data files, SAS program files, and SAS data bases were used to maintain the integrity of each investigator's data and to allow for ready access to all data. DOE

**N83-17068#** Technische Hogeschool, Eindhoven (Netherlands)  
Medical Electrical Engineering Group

**DIRECT MEASUREMENT OF BLOOD PRESSURE BY LIQUID-FILLED CATHETER MANOMETER SYSTEMS**

J L C PLASMAN and C M M TIMMERS Jul 1981 51 p refs  
(EUT-81-E-121, ISBN-90-6144-121-8) Avail NTIS HC A04/MF A01

The reproduction of the blood pressure waveform when catheter-manometer systems are used is discussed. It is shown that a hydraulic system with short, stiff and wide bore (1.8 mm) lines which contain no, or hardly any, air bubbles and have a minimum of connections should be used. It is also shown that the amplitude versus frequency characteristic and the phase versus frequency characteristic of hydraulic systems with relatively low undamped resonant frequency (40 Hz) and low damping ratio (0.15) can be markedly improved by using electrical filtering techniques.

Author (ESA)

**N83-17069#** Research Inst of National Defence, Stockholm (Sweden)

**THERMAL EFFECTS OF HEAT AND MICROWAVE ON RATS [TERMISKA EFFEKTER AV VAERME - OCH MIKROVAAGOR PAA RAATTA]**

O CRIBORN, C J CLEMEDSON, and C HENRIKSSON Jul 1982 21 p refs In SWEDISH  
(FOA-C-54042-H1) Avail NTIS HC A02/MF A01

Radiation tests on rats, inside a thermal zone with 2450 MHz microwaves, showed a momentary mental reaction which probably was not directly a result of the temperature elevation. Microwaves induced 10 times higher thermal effects than a heat radiation lamp of a corresponding intensity, the radiation intensity being determined from the temperature elevation values of water in a plastic container. In anesthetized rats the body temperature increase is two times higher than in controls, both under heat or microwave radiation. No obvious temperature rise in the brain, compared with the body temperature, was observed. Anesthetized and nonanesthetized animals show an acceleration of the respiratory rate as the body temperature increases. At microwave intensities over 30 mW/sqcm the rats could not smooth away the induced thermal effects and the body temperature rose.

Author (ESA)

**N83-17070#** Research Inst of National Defence, Stockholm (Sweden)

**ANTHROPOMETRIC MEASUREMENTS FORECAST ON SWEDISH PILOTS IN THE YEAR 2001 [PROGNOS FOER ANTROPOMETRISKA MAATT HOS SVENSKA FLYGFOERARE AAR 2001]**

T LEVIN and O WILSON Apr 1982 192 p refs In SWEDISH  
(FOA-C-59004-H2) Avail NTIS HC A09/MF A01

Body height increase of Swedish men and changes in body dimensions of applicants for aircraft pilot training are reported, body height, weight, and dimensions in sitting position of pilot candidates and of regular pilots are compared with the measurements of other inductees and draftees of the same age. Maximum and minimum values for body height were selected as a limiting variable, and height in the sitting position as the decision variable. The selected values were studied on applicants for pilot training and the exclusion of candidates was analyzed. Forecasting on other body dimensions was also carried out. Threshold values for the body dimensions of future pilot candidates are presented. Available room in the aircraft and admittance stipulations are considered.

Author (ESA)

**N83-17071#** Maryland Univ, Baltimore Div of Pulmonary Diseases

**PULMONARY FUNCTION AND BRONCHIAL REACTIVITY IN HUMAN SUBJECTS WITH EXPOSURE TO OZONE AND RESPIRABLE SULFURIC ACID AEROSOL. AN ENVIRONMENTAL CHAMBER STUDY Final Report, Nov. 1976 - Jun. 1980**

T J KULLE, H D KERR, B P FARRELL, L R SAUDER, and D L SWIFT Jul 1982 44 p refs Prepared in cooperation with Johns Hopkins University, Baltimore  
(Contract EPA-R-803804)  
(PB82-255126, EPA/600/1-82-012) Avail NTIS HC A03/MF A01 CSCL 06T

A three-year research study was conducted investigating the effects of individual and sequential exposures to ozone and sulfuric acid aerosol on pulmonary function and bronchial reactivity in human subjects. In healthy smokers and nonsmokers exposed for 4 hours to 98 micrograms/cu m 0.14 micrometers H<sub>2</sub>SO<sub>4</sub> aerosol, no significant changes in pulmonary function were observed with exposure or 24 hours post-exposure. The effect of 0.3 ppm O<sub>3</sub> on a subsequent exposure to 100 micrograms/cu m, 0.13 micrometers H<sub>2</sub>SO<sub>4</sub> aerosol was studied in nonsmoking subjects to determine if pre-exposure to O<sub>3</sub> would sensitize these individuals to H<sub>2</sub>SO<sub>4</sub> aerosol.

Author (GRA)



**N83-17494#** Canadian Forces Air Command, Winnipeg (Manitoba)

**A BRIEF REVIEW OF SELECTED AREAS OF AVIATION MEDICINE AND PHYSIOLOGY**

W C HARTZELL *In* AGARD Human Factors Aspects of Aircraft Accidents 21 p Oct 1982 refs

Avail NTIS HC A07/MF A01

Aviation medicine and physiology are reviewed with specific focus on those aspects which relate to safety and accidents. Specific emphasis is given to the aeromedical aspects of the effects of altitude, the acceleration environment, disorientation stresses and visual function and problems in flight, as these areas are felt to have most significant potential impact on flight safety. The presentation is concluded with a brief discussion of the common acute causes for grounding and sudden incapacitation which are of concern in military aviation. Author

**N83-17496#** Edinburgh Univ (Scotland) Dept of Forensic Medicine

**PATHOLOGY ASPECTS OF THE HUMAN FACTORS INVESTIGATION**

J K MASON *In* AGARD Human Factors Aspects of Aircraft Accidents 5 p Oct 1982 refs

Avail NTIS HC A07/MF A01

The principles of aviation pathology are outlined, with particular emphasis on utilizing autopsy examination in search of the twin objectives of establishing the cause of the accident or assessing the reason for fatalities occurring. The prevention of fatal accidents is illustrated by the use of pathology in the development of the ejection seat and by a study of light aircraft accidents resulting in fatal head injuries. In accidents involving large aircraft, the importance of establishing a pattern of injuries so as to indicate the type of the accident is enlarged upon. Pathology is regarded as an essential part of the investigation of an aircraft accident but, like any other discipline, it only functions at its best in the context of a 'group system'. Author

**N83-17499#** Air Force Hospital, England AFB, La  
**AIRCRAFT ACCIDENT INVESTIGATION AND THE FLIGHT SURGEON**

R B RAYMAN *In* AGARD Human Factors Aspects of Aircraft Accidents 8 p Oct 1982 refs

Avail NTIS HC A07/MF A01

The essentials of aircraft accident investigation are described. The flight surgeon's role is to determine the cause of injury/death, to decide if egress/life support equipment functioned properly during the escape, survival, and rescue sequence, and to ascertain if there were medical or human factors which contributed to the accident. How the flight surgeon fulfills this role is discussed. Author

**N83-17500#** Edinburgh Univ (Scotland) Dept of Forensic Medicine

**MEDICO LEGAL ASPECTS OF THE PATHOLOGICAL INVESTIGATION**

J K MASON *In* AGARD Human Factors Aspects of Aircraft Accidents 5 p Oct 1982 refs

Avail NTIS HC A07/MF A01

The medico legal aspects of aircraft accidents are described from the viewpoint of a major international airline disaster as it is in such a situation that the problems are maximized. The importance of identification of cadavers both in the legal field and in accident investigation is stressed. Insurance problems in passengers are discussed and mention made of the very specific problem of aviation simultaneous death. The investigation for criminal activity is outlined, particular emphasis being placed on radiology. In view of the importance to individual families of many of these questions, a plea is made for standardization of techniques throughout the world. Author

**N83-18193#** Army Intelligence and Threat Analysis Center, Arlington, Va

**THERAPEUTIC-PROPHYLATIC MEASURES IN DISEASES OF THE ORGAN OF VISION AMONG FLYING PERSONNEL**

L M ASYYEV *In* its Mil Med J, No 8, August 1982 p 61-64 Aug 1982 refs Transl into ENGLISH from Voenno-Med Zh (Moscow), no 8, 1982 p 41-42

Avail NTIS HC A07/MF A01

Among persons with various flight specialties the following states and diseases of the eyes requiring particular attention of ophthalmologists were most frequently seen: slight degrees of refractory anomalies (myopia, hypermetropia, astigmatism), slight disorders of accommodation (presbyopia, false myopia), inflammatory disease of the conjunctiva and edges of the lids (chronic conjunctivitis, blepharitis, blepharoconjunctivitis), cornea and internal envelopes of the eye (keratitis, iridocyclitis, chorioretinitis), as well as the after effects of these diseases. Author

**N83-18201#** Joint Publications Research Service, Arlington, Va  
**SPACE MEDICINE BENEFITS TO SCIENCE AND HEALTH CARE**

B S ALYAKRINSKIY *In* its USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 1-4 17 Jan 1983 Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 4-6

Avail NTIS HC A08/MF A01

The problems of weightlessness and hypokinesia are discussed in the context of a very general review of the problems of aerospace medicine. R J F

**N83-18203#** Joint Publications Research Service, Arlington, Va  
**PHYSIOLOGICAL AND HYGIENIC ASPECTS OF IMPLEMENTATION OF COSMONAUTS WORK IN ORBITAL FLIGHT**

I P ABRAMOV, A S BARER, M I VAKAR, L G GOLOVKIN, V P ZINCHENKO, S N FILIPENKOV, R K SHARIPOV, and V V SHCHIGOLEV *In* its USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 18-25 17 Jan 1983 Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 16-22

Avail NTIS HC A08/MF A01

Physiological-hygienic evaluations of space suits, data of the pre-flight training and extravehicular activities of the Salyut-6 crew members are discussed. Changes in physiological parameters, energy expenditures, heat release and associated performance of the automatic life support system are discussed. Physiological-hygienic aspects of the extravehicular activity of the Salyut-6 crew members are discussed. R J F

**N83-18204#** Joint Publications Research Service, Arlington, Va  
**CHANGES IN VOLUME OF PLASMA, EXTRACELLULAR FLUID AND PLASMA PROTEIN MASS DURING ANTIORTHOSTATIC HYPOKINESIA AND IMMERSION**

A M CHAYKA and I S BALAKHOVSKIY *In* its USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 26-34 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 22-28

Avail NTIS HC A08/MF A01

The fate and role of plasma proteins in the regulation of the intravascular volume and fluid redistribution are discussed. Twenty-four young volunteers were experimental runs. The purpose was to measure volumes of plasma and extracellular fluid, as well as concentrations of plasma proteins and hemoglobin. The results varied but in most cases the plasma volume decreased by 0.446 to 0.55 l, extra-cellular fluid volume by 0.75 to 2.15 l, and plasma proteins by 13.4 to 30.4 g. The hemoglobin concentration increased by 8 to 12% and that of plasma proteins in some cases grew and in others diminished. Water loading prevented the plasma volume decreases. R J F

**N83-18205#** Joint Publications Research Service, Arlington, Va  
**EFFECT OF SYDNOCARB ON CARDIORESPIRATORY SYSTEM DURING SEVEN-DAY WATER IMMERSION AND EXERCISE**

O D ANASHKIN and S M BELYAYEV *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov-Dec 1982 (JPRS-82654) p 35-40 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 35-40  
 Avail NTIS HC A08/MF A01

To study physiological effects of weightlessness, 12 male volunteers, aged 25-33, were exposed to 7-day water immersion. The test subjects were divided into two groups of 6 in each the first group subjects were given a new Soviet stimulant sydnocarb (3-(beta-phenylisopropyl)-N-phenylcarbamoyl sydnominine) and the second group subjects were given a placebo, using the double-blind method. To evaluate the cardio-respiratory function, the test subjects exercised on a bicycle ergometer before and after water immersion. During exercises ECG, heart rate, minute respiration volume, oxygen consumption, carbon dioxide production, cardiac output and oxygen pulse were recorded. The test subjects on the placebo showed a significant decrease of oxygen consumption at maximum workload. Those who were given sydnocarb maintained normal oxygen consumption during bicycle ergometry. The drug increased the workload per kg body weight, maintained physical work capacity, and improved the cardiovascular function after immersion. Author

**N83-18206#** Joint Publications Research Service, Arlington, Va  
**HUMAN EQUILIBRIUM DURING ROTATION AT DIFFERENT LEVELS OF HYPERGRAVITY**

A R KOTOVSKAYA, L N GAVRILOVA, R R GALLE, F GLAVACKA, M SCHALLING, and P DUDA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 41-44 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 32-34  
 Avail NTIS HC A08/MF A01

The gravity (of up to 2 g) effect on the upright stability of 16 test subjects exposed either to centrifugation or to artificially increased body weight (with uniformly distributed loading) is discussed. During centrifugation the stabilographic parameters increased significantly at every gravity level. In the experiments with artificially increased body weight the area of the vector stabilograms also increased significantly. The comparison of the two experimental runs suggests that disorders in the upright stability are caused by the rotation factor rather than by the artificially increased body weight. R J F

**N83-18213#** Joint Publications Research Service, Arlington, Va  
**EVALUATION OF DEGREE OF GENETIC DETERMINATION OF HUMAN CARDIORESPIRATORY REACTIONS TO HYPOXIA AND HYPERCAPNIA**

T V SEREBROVSKAYA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 75-81 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 54-58  
 Avail NTIS HC A08/MF A01

Using the twin method (16 pairs of monozygotic and 14 pairs of dizygotic twins), the role of the genotype and environment in the phenotypic variations of cardiorespiratory reactions to increasing hypoxia and hypercapnia was investigated. The process of emergency adaptation to acute hypoxia was shown to be associated with both genetically determined potentialities and acquired abilities. It is suggested that regular training may change sensitivity and emergency mechanisms of adaptation to hypoxia. However, the level of these changes depends on the individual genotype. The variability of hypercapnia sensitivity which is an individual genetically determined constant appears to be very low. M G

**N83-18215#** Joint Publications Research Service, Arlington, Va  
**SEASONAL DYNAMICS OF CIRCADIAN RHYTHM OF HEMODYNAMICS AND ARTERIAL PRESSURE PARAMETERS IN PERMANENT RESIDENTS OF FOOTHILL AND HIGH-ALTITUDE REGIONS**

M T TURKMENOV and T K ABDYLDABEKOV *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 87-93 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 62-66  
 Avail NTIS HC A08/MF A01

Diurnal and seasonal variations of hemodynamics parameters and blood pressure in high altitude residents (3200 m above sea level) were studied. The physiological functions showed a distinct rhythmicity. Amplitude phase characteristics of the physiological parameters were calculated according to the Kosinor program. Author

**N83-18217#** Joint Publications Research Service, Arlington, Va  
**NATURAL IMMUNITY FACTORS AS INDICATORS OF REACTIONS TO HELIOGEOGRAPHICAL FACTORS**

L A GUSHCHINA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 97-100 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 68-71  
 Avail NTIS HC A08/MF A01

The data treatment of immunological examinations of 2300 donors with the aid of the Distribution and Factor Analysis programs revealed a distinct relationship between natural immunity parameters and the heliophysical activity. The main heliophysical complex included solar flare intensity, radio frequency radiation and surface area of sunspots. Among the natural immunity parameters humoral factors of nonspecific protection showed the greatest variations. Author

**N83-18218#** Joint Publications Research Service, Arlington, Va  
**EFFECT OF LONG-TERM EXPOSURE TO HIGH-INTENSITY STEADY MAGNETIC FIELD ON ACTIVITY OF ADRENERGIC AND CHOLINERGIC SYSTEMS**

L D KLIMOVSKAYA and A F MASLOVA *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 101-105 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 71-74  
 Avail NTIS HC A08/MF A01

The mice exposed for 1 month to a constant magnetic field of 16 T showed a significant increase in the epinephrine and norepinephrine concentration of blood. The acetylcholine content of blood grew on the 3d week of the exposure. The content of neurotransmitters in the brain tissue increased during the 3d week and returned to the normal by the end of the exposure. Author

**N83-18220#** Joint Publications Research Service, Arlington, Va  
**SHORT-TERM ACOUSTIC ADAPTATION AS A CRITERION OF RESISTANCE OF THE AUDITORY SYSTEM TO NOISE**

A S ROZENBLYUM *In its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 110-114 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 76-79  
 Avail NTIS HC A08/MF A01

The typological features of short term acoustic adaptation (STAA) and its applicability for evaluating the hearing resistance to noise effects were investigated in those working in a noisy environment. The experiments were carried out on 29 subjects with normal hearing and 46 patients with neurosensory hypoacusis, including 25 patients with occupational hypoacusis. The STAA magnitude was evaluated as the difference between the hearing threshold of the 20 msec signal paired with a preceding adapting signal or without it. The duration of the adapting signal was in the range 20-1000 msec and its intensity was 40 dB over the hearing threshold. The signals were applied at 50 msec intervals. The

STAA value was 5-25 dB in 90% normal subjects. In the patients with occupational hypoacusis, the hearing degradation increased as STAA declined. The patients with common neurosensory hypoacusis did not show such a relationship. It is recommended to use STAA as a measure of man's hearing resistance to noise effects. Author

**N83-18221#** Joint Publications Research Service, Arlington, Va. **AMPLITUDE DISTORTIONS ON RHEOGRAMS WHEN RECORDED SIMULTANEOUSLY ON SEVERAL CHANNELS** R K TUKSHAUTOV and D G MAKSIMOV. In *its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 115-118. 17 Jan 1983. refs. Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 80-82. Avail NTIS HC A08/MF A01.

Rheography is one of the important methods for indirect evaluation of circulation and external respiration. This method is based on determination of electric resistance of the tested part of the human or animal body to high frequency electric current. In Soviet medicine and physiology, different types of rheographs are used for this purpose: bipolar, four channel, without frequency separation of channels (IRG-1A), bipolar, with frequency separation of channels (RG-4-01), and tetrapolar, two channel, with one generator for both channels (RPG-2-02). The instrumental margin or error is + or 5%, however, overall error factor could reach 10-20% and, in some cases, even more. One of the causes of such error factors could be the influence of rheographic leads on one another with multichannel recording. The conditions of appearance and magnitude of possible distortions of rheogram amplitudes when recorded simultaneously on two channels are defined. B W

**N83-18224#** Joint Publications Research Service, Arlington, Va. **EFFECT OF STEADY MAGNETIC FIELD ON HUMAN LYMPHOCYTES** M MILEVA, B IVANOV, M BULANOVA, and T PANTEV. In *its* USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 128-130. 17 Jan 1983. refs. Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 86-87. Avail NTIS HC A08/MF A01.

Exposure to steady magnetic field (SMF) for different periods of time did not elicit statistically reliable increase in chromosome aberrations in human peripheral blood lymphocytes. Metaphase analysis of Crepis capillaris cells revealed that SMF (9 kOe, 200 Oe/cm) for 2 days did not induce chromosome aberrations. Nor were any changes demonstrated in roots of beans, onions and L-fibroblasts of subcutaneous tissue of mice and Chinese hamsters. The obtained data are indicative of absence of cytogenetic effect of SMF. The level and spectrum of chromosome aberrations did not exceed the values for spontaneous chromatic fragments in cultures. Cytogenetic analysis of DEDE cells of the Chinese hamster revealed a mild mutagenic effect of SMF. Chromosomal aberrations were also demonstrated after exposure (5 min) of garlic roots. B W

**N83-18229#** Joint Publications Research Service, Arlington, Va. **PROBLEM OF RAISING BODY'S RESISTANCE TO EFFECT OF ENVIRONMENTAL CHEMICAL POLLUTANTS** Y I PROKOPENKO. In *its* USSR Rept Life Sci Biomed and Behavioral Sci, No 26 (JPRS-82544) p 27-32. 28 Dec 1982. refs. Transl into ENGLISH from Gigiyena i Sanit (Moscow), no 12, Dec 1981 p 8-10. Avail NTIS HC A04/MF A01.

Raising the activity of defensive-adaptive mechanisms in relation to the action of chemical compounds contained in the environment is addressed. Author

**N83-18230\*** National Aeronautics and Space Administration, Washington, D C

**AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 240, JANUARY 1983**

Jan 1983 113 p  
(NASA-SP-7011(240), NAS 1 21 7011(240)) Avail NTIS HC \$7.00 CSCL 06E

Reports, articles and other documents, numbering 357, introduced into the NASA scientific and technical information system in December 1982 are given. R J F

**N83-18231#** Los Alamos Scientific Lab, N Mex **NERVE-PULSE INTERACTIONS**

A C SCOTT 1982 24 p refs. Presented at the US/Japan Seminar on Competition and Cooperation in Neural Nets, Kyoto, 15-19 Feb 1982.

(Contract W-7405-ENG-36)  
(DE82-006133, LA-UR-81-3728, CONF-820209-1) Avail NTIS HC A02/MF A01

Some recent experimental and theoretical results on mechanisms through which individual nerve pulses can interact are reviewed. Three modes of interactions are considered: (1) interaction of pulses as they travel along a single fiber which leads to velocity dispersion, (2) propagation of pairs of pulses through a branching region leading to quantum pulse code transformations, and (3) interaction of pulses on parallel fibers through which they may form a pulse assembly. This notion is analogous to Hebb's concept of a cell assembly, but on a lower level of the neural hierarchy. DOE

**N83-18232#** Los Alamos Scientific Lab, N Mex **INDUCIBLE PROTECTIVE PROTEINS: A POTENTIALLY NOVEL APPROACH TO CHEMOTHERAPY**

R A TOBEY, M D ENGER, J K GRIFFITH, and C E HILDEBRAND 1982 32 p refs. Presented at the Conf on Cell Proliferation, Cancer and Cancer Therapy, New York, 17-19 Feb 1982.

(Contract W-7405-ENG-36)  
(DE82-008116, LA-UR-82-382, CONF-820231-1) Avail NTIS HC A03/MF A01

A variety of trace elements (Zn, Se, Cu, As) were utilized as inducers of synthesis of protective species in line CHO Chinese hamster cells and in a number of derived variants to determine if this approach can be utilized to increase resistance to alkylating agent toxicity. It is indicated that Zn, Se, and Cu elicit a protective response against the toxic effects of iodoacetate or melphalan, and, at least in the case of zinc, at levels which are physiologically reasonable. Arsenite appears to be a marginally effective inducer in the CHO cell. The protective responses induced by zinc or selenite alone are additive in cells receiving both trace element prior to exposure to alkylating agent. It is suggested that different domains of response are elicited by the two metals. Differences in inducibility of protective proteins between normal and tumor cells, the possibility for a novel approach to alkylating agent chemotherapy, is somewhat analogous to the protocol utilized in high dose methotrexate therapy. DOE

**N83-18233#** Oak Ridge National Lab, Tenn. Biology Div **SPECIES HETEROGENEITY IN THE METABOLIC PROCESSING OF BENZO(A)PYRENE**

J K SELKIRK, M C MACLEOD, B K MANSFIELD, P A NIKBAKHT, and K C DEARSTONE 1981 21 p refs. Presented at the Symp on Organ and Species Specificity in Chem Carcinogenesis, Raleigh, N Car, 2 Mar 1981. Sponsored in part by the National Cancer Inst.

(Contract W-7405-ENG-26)  
(DE82-008843, CONF-8103119-1) Avail NTIS HC A02/MF A01

The drug metabolizing microsomal mixed-function oxidase is a complex of enzymes required for the activation and detoxification of xenobiotics. Metabolism studies with many chemical carcinogens and mutagens showed a remarkable qualitative similarity in the metabolic products formed by this enzyme complex. However, there

is considerable variance from a quantitative aspect at several important levels. Variable levels of mixed function oxidase and the detoxification epoxide hydrolase may be found within a given activation system. This in turn may dictate whether there will be a high or low relative level of reactive electrophile available for interaction with critical target sites. Benzo(a)pyrene, a major environmental carcinogen and mutagen, was used as the paradigm for environmental chemical carcinogens. The metabolism of B(a)P in human and rodent cell lines was studied to determine quantitative and qualitative variance between species. DOE

**N83-18234#** Wisconsin Univ., Madison Dept. of Medical Physics

**SEMI-PHENOMENOLOGICAL METHOD FOR APPLYING MICRODOSIMETRY IN ESTIMATING BIOLOGICAL RESPONSE**

P. D. HIGGINS, P. M. DELUCA, JR., D. W. PEARSON, and M. N. GOULD 1981 18 p refs

(Contract DE-AS02-76EV-01105, NIH-1T32-CA-09206-01(PDH), NCI-P30-CA-19298, NCI-P01-CA-19298)

(DE82-009367, DOE/EV-01105/283) Avail NTIS HC A02/MF A01

A semi-phenomenological approach was used to estimate cell survival on the basis of microdosimetrically obtained measurements of beam quality, together with determinations of the biological cytotoxic response parameters of V79 Chinese hamster cells. Cells were exposed to a field of minimally ionizing radiation and to fields at least partially comprised of high LET radiation. It was shown that for widely varying experimental conditions cell survival can be predicted with good reliability for any arbitrary known beam quality and with a minimum of biological input. DOE

**N83-18235#** Wisconsin Univ., Madison Dept. of Medical Physics

**FAST-NEUTRON AND PHOTON DOSES DETERMINED WITH PROPORTIONAL COUNTERS AND IONIZATION CHAMBERS**

P. M. DELUCA, JR., P. D. HIGGINS, M. C. SCHELL, and D. W. PEARSON 1981 15 p refs

(Contract DE-AS02-76EV-01105, NIH-5T32-CA-09206-01)

(DE82-009369, DOE/EV-01105/285) Avail NTIS HC A02/MF A01

The application of paired miniature proportional counters to  $n/\gamma$  dose separation is reported. A  $^{60}\text{Co}$  teletherapy source was coupled to an existing source of fast neutrons. These sources may be operated to provide precise and controlled mixtures of photons and neutrons. Graphical and A150 plastic-walled proportional counters were employed. Results are compared to dose values deduced from a conventional A150 plastic ionization chamber and a neutron-insensitive GM counter. DOE

**N83-18236#** Wisconsin Univ., Madison Dept. of Medical Physics

**APPLICATION OF A150-PLASTIC EQUIVALENT GASES IN MICRODOSIMETRIC MEASUREMENTS**

P. M. DELUCA, JR., P. D. HIGGINS, D. W. PEARSON, M. C. SCHELL, and F. H. ATTIX 1981 23 p refs

(Contract DE-AS02-76EV-01105, NIH-1T32-CA-09206-01(PDH), NCI-P30-CA-19298, NCI-P01-CA-19298)

(DE82-009368, DOE/EV-01105/284) Avail NTIS HC A02/MF A01

Neutron dosimetry measurements with ionization chambers which for the most part, employ tissue equivalent plastic-walled cavities filled with either air or a methane base tissue-like gas are discussed. The atomic composition of TE gas and A150 plastic are not matched and are quite dissimilar from muscle. A novel A150 plastic equivalent gas was formulated. This establishes a homogeneous wall gas cavity dosimeter for neutron measurements and confines the necessary corrections to the applications of kerma ratios. Measurements of applications of two A150 plastic equivalent gases in a low pressure spherical proportional counter are presented. Gas gains and alpha particle resolutions were determined. Measurements of event size distributions from exposure to a beam of 14.8 MeV neutrons are reported for the

A150 mixtures and a methane based TE-gas and an Ar-CO<sub>2</sub> mixture. DOE

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## BEHAVIORAL SCIENCES

Includes psychological factors, individual and group behavior, crew training and evaluation, and psychiatric research.

**A83-20075**

**PILOT PERFORMANCE AND STRESS - SEARCH FOR A KILLER**

F. C. SANDERS (Society of Experimental Test Pilots, Mini-Symposium, 12th, San Diego, CA, Apr 2, 3, 1982) Cockpit, vol 17, Oct-Dec 1982, p 20-27 refs

The psychophysiological responses to stress, the causes of stress, and the implications for test pilots are explored. Stress stimulates the hypothalamus and the pituitary gland, which releases ACTH into the blood. The ACTH activates the adrenal glands, which release substances that increase the physical capacity to cope with danger. The reticular formation is the gating point for sensations directed toward the brain, and is also the site of large endorphin supplies, which are released in times of danger (stress). However, if a person experiences long-term stress, a deterioration in performance will occur, since the natural opiates (endorphins) are anesthetizing the signal-carrying ability of the reticular formation. A study has shown that the willingness to take risks is directly proportional to the incidence of accidents on aircraft carriers. It is indicated that extended stress can be caused by personal recognition that participation in an activity is dangerous, over a long period of anticipation, and if there is no opportunity for recent practice. Various behavioral indicators of a possible performance deterioration due to stress are described. M S K

**A83-20330**

**BIOFEEDBACK AS AN IMPORTANT MECHANISM IN THE SUCCESS OF TEACHING HUMANS TO CONTROL THE SKIN-GALVANIC REACTION [OBRAZNAIA BIOLOGICHESKAIYA SVIAZ' KAK VAZHNYI MEKHANIZM V USPEKHE OBUCHENIYA CHELOVEKA UPRAVLENIU KOZHNO-GAL'VANICHESKOI REAKTSIEI]**

V. A. GLAZKOVA In Experimental methods and techniques for the investigation of operator activity. Moscow, Izdatel'stvo Nauka, 1982, p 37-41. In Russian

Results of experiments are presented which show that biofeedback techniques can be successfully utilized to teach humans to consciously suppress their emotions, as indicated by the magnitude of the skin-galvanic reaction. The effect of teaching is achieved after 10-12 sessions of a 20-30 minute training period, which uses visual stimulation and skin-electrical punishment. The signal of the skin-galvanic reaction is a feedback signal. Control experiments confirm the stability of the operant reflex in humans which is attained by using the biofeedback technique. N B

**A83-20331**

**THE SPECTRAL-STRUCTURAL ANALYSIS OF SPEECH AS ONE OF THE PARAMETERS OF CHANGE IN THE FUNCTIONAL CONDITION OF AN OPERATOR [SPEKTRAL'NO-STРУКТУРNYI ANALIZ RECHI KAK ODIN IZ POKAZATELEI IZMENENIYA FUNKTSIONAL'NOGO SOSTOYANIYA OPERATORA]**

N. A. ERASHCHENKO and O. A. CHERKASOV In Experimental methods and techniques for the investigation of operator activity. Moscow, Izdatel'stvo Nauka, 1982, p 42-45. In Russian

A83-20337

THE CHANGES OF SEVERAL PARAMETERS OF THE QUALITY OF THE ACTIVITY AND THE FUNCTIONAL CONDITION OF AN OPERATOR DURING THE PROCESS OF FORMING CONTROL HABITS IN A TRACKING REGIME [IZMENENIE NEKOTORYKH POKAZATELEI KACHESTVA DEIATEL'NOSTI I FUNKTSIONAL'NOGO SOSTOIANIIA OPERATORA V PROTSESSE FORMIROVANIYA NAVYKOV UPRAVLENIYA V REZHIME SLEZHENIYA]

V I ZORILE, A S KUZMIN, and A V CHUNTUL In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 75-82 In Russian refs

Quantitative changes in various parameters of the quality of work and the physiological system are determined for operators during the process of forming control habits in a tracking regime. The habits were formed by daily training for 30 minutes on a specially constructed device for tracking experiments. Various parameters were measured during the training, including the errors of control, the pulse rate, minute volume, the bioelectrical activity of the shoulder muscles, and psychophysiological tests. It is concluded that a sufficiently complete evaluation of the process of forming control habits in a tracking regime can be obtained using the changes in the quality of work, as well as the condition of the physiological function of the motor analyzer of an operator

N B

A83-20341

THE DEPENDENCE OF THE EYELID MOTION REACTION PARAMETERS OF AN OPERATOR ON THE COMPLEXITY OF A VISUAL TASK [ZAVISIMOST' PARAMETROV VEKODVIGATEL'NOI REAKTSII OPERATORA OT SLOZHNOСТИ ZRITEL'NOI ZADACHI]

E P SVIRIDOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 106-110 In Russian

Results are presented for experiments with models of the visual activity of operators which have varying degrees of complexity. The working characteristics of the operator were measured, as well as several physiological parameters of his functional condition. The behavioral parameters of the eyelid motion reaction were compared for the aftereffect which arose following the completion of a visual task at two levels of complexity for the activity of the operator. A significant difference was detected between simple and complex visual tasks according to the average parameters of the length and frequency of the eyelid motion reaction, and also by the character of the distribution of parameters for all groups of subjects. These results can be utilized to analyze the activity of operators in which the visual analyzer plays the primary role

N B

A83-20344

THE PATTERN OF THE ENERGY CHARACTERISTICS OF THE EEG AS AN INDICATOR OF THE EFFECTIVENESS OF THE AUTOGENIC STIMULATION OF WORK CAPACITY [DINAMIKA ENERGETICHESKIKH KHARAKTERISTIK EEG KAK POKAZATEL' EFFEKTIVNOSTI AUTOGENNOI STIMULIATSII RABOTOSPOSObNOSTI]

A I SKRYPNIKOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 119-124 In Russian refs

The use of EEG parameters to evaluate the effectiveness of autogenic training (psychosomatic self-regulation) if a human operator is investigated. It is found that at various stages of the mastering and utilization of autogenic training, the patterns of the EEG can be used as a criterion for the effectiveness of this training. The use of autogenic training to the fullest extent, including the phase of activation, provides a good activating effect, which is accompanied by a steady increase in the energy of the alpha-rhythm of the operator

N B

A83-20345

THE OBJECTIVE EVALUATION OF THE MOTIVATIONAL AND EMOTIONAL ASPECTS OF THE ACTIVITY OF A HUMAN OPERATOR [K OB'EKTIVNOI OTSENKE MOTIVATSIONNO-EMOTSIONAL'NYKH ASPEKTOV DEIATEL'NOSTI CHELOVEKA-OPERATORA]

E A IVANOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 125-130 In Russian refs

A method is developed which provides an objective evaluation of the emotional and motivational level of a human operator during activity. This method uses a test of visual-motor tracking, and smooth sinusoidal and stepped curves are used as signals. Results of experimental tests show the high reliability and sensitivity of this method. In addition, it is found that the effect of emotions acts not only on the mobility level of the processes in the eye-hand system, but also on a series of other characteristics, and especially on the stimulating processes in the central nervous system and on the activation level of the visual analyzer

N B

A83-20347

THE RECOGNITION OF THE CONDITION OF FATIGUE AND EMOTIONAL STRESS ACCORDING TO THE PARAMETERS OF A SPEECH SIGNAL [RASPOZNAVANIE SOSTOIANIIA UTOMLENNIIA I EMOTSIONAL'NOGO NAPIAZHENIYA PO PARAMETRAM RECHEVOGO SIGNALA]

M V FROLOV and O A CHERKASOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 137-141 In Russian

A method is developed for evaluating the level of the fatigue and emotional stress of an operator according to speech-signal parameters. The method utilizes the frequency of the oscillation of the vocal cords and the average number of crossings by the speech process of the zero level per unit time. It is found that this method can be used to differentiate fatigue levels from the condition of the emotional stress of an operator. It is concluded that this method can be used for investigations of the conditions of fatigue which arise during prolonged monotonous work, such as observation, tracking, and waiting

N B

A83-20348

THE PECULIARITIES OF THE OPTIMIZATION OF THE VISUAL ACTIVITY OF AN OPERATOR UNDER CONDITIONS OF A TIME DEFICIT [OSOBENNOSTI OPTIMIZATSII ZRITEL'NOI DEIATEL'NOSTI OPERATORA V USLOVIIKH DEFITSITA VREMENI]

O O RIUMIN In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 141-147 In Russian refs

Results of experimental investigations are presented concerning the effect of different colored backgrounds for a visual signal on the quality of an operator's activity. The parameters of the visual signal correspond to the threshold perception of the operator's visual analyzer against a background of noise signals of various intensities in the conditions of a strict time limit for the completion of the indicated tasks. It is found that effective completion of the tasks depends on the operator's psychophysiological conditions and on the presence of a time limit. The operator's activity can be optimized by improving the initial characteristics of the signal parameters and by a simultaneous use of methods of the psychosomatic corrections of the operator's condition. The situations studied in this investigation are modeled closely on those pertaining to air traffic controllers and pilots

N B

A83-20349

**THE PATTERNS OF SEVERAL PARAMETERS OF SPEECH FLOW OF PRODUCTION LINE OPERATORS [DINAMIKA NEKOTORYKH PARAMETROV RECHEVOGO POTOKA U OPERATOROV POTOCHNYKH LINII]**

N A ERASHCHENKO In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 157-162 In Russian refs

The patterns of the temporal characteristics of speech are investigated as parameters for determining the level of fatigue in production line workers during regular working conditions. The speech parameters utilized include the speed of the articulation, the average length of clear speech, and the average length of pauses. It is found that these parameters provide a sufficiently accurate measure of the psychophysiological condition of the human operator and reveal the hours of the greatest work capacity of the operators. N B

A83-20622

**PRESENTATION EFFECTS AND EYE-MOTION BEHAVIORS IN DYNAMIC VISUAL INSPECTION**

R N WENTWORTH (New Haven University, New Haven, CT) and J R BUCK (Iowa, University, Iowa City, IA) Human Factors, vol 24, Dec 1982, p 643-658 refs

The results of a dynamic visual inspection task featuring a single highly discriminable fault and with one object at a time are presented. An industrial situation with a conveyor belt carrying a line of products in front of the inspector was considered. Type I errors, i.e., acceptance of a defective item, and type II errors, i.e., rejection of an acceptable item, were examined in trials involving 12 subjects. Polyethylene squares with four dots for acceptance or three dots for rejection moved past, while the subjects pushed either accept or reject buttons. The dots were randomly located and rode on belts that could change speeds and reverse direction. Visual acquisition time, tracking time, and slack time were determined. Statistical analyses revealed that errors increased with belt velocity, with a modification present due to target interspacing. Some visual preparation time was found to occur with sufficient spacing or time intervals between objects, and performance was positively correlated with the amount of time available for visual tracking. M S K

A83-20625

**COGNITIVE LOAD AND THE FUNCTIONAL FIELD OF VIEW**

L J WILLIAMS (South Dakota, University, Vermillion, SD) Human Factors, vol 24, Dec 1982, p 683-692 refs

In an experiment that kept visual display factors constant but which varied cognitive load, it was found that cognitive load modulated the functional field of view. When given a high level of foveal (cognitive) load, the functional field of view was only about 2 deg in diameter, whereas a low level of foveal load resulted in a functional field of about 4 deg diameter. The shrinkage of the functional field appeared to be rather generalized and not a true tunnel-vision effect. (Author)

A83-20784

**DEVELOPMENT OF PERFORMANCE EVALUATION TESTS FOR ENVIRONMENTAL RESEARCH /PETER/ - NAVIGATION PLOTTING**

S F WIKER (Michigan, University, Ann Arbor, MI), R S KENNEDY (Canyon Research Group, Inc., Westlake Village, CA), and R L PEPPER (U S Naval Ocean Systems Center, San Diego, CA) Aviation, Space, and Environmental Medicine, vol 54, Feb 1983, p 144-149 Research supported by the U S Coast Guard and U S Navy refs

A test measuring navigator skills was examined as a candidate for inclusion in a PETER test battery featuring simulated ocean vessel motion to assess the effects of motion on navigator performance. Two separate trials were run, each with 17 subjects, with one group from the Navy and one from the Coast Guard. The subjects were required to plot relative position reports and distance measurements between their ship and a randomly generated target vessel. A pair of dividers was used, together

with a maneuvering board nomogram to ascertain the ship's relative speed. The Navy group performed 175 hr trials each day for 16 days, while the second group nominally underwent 65 hr of tests. The correlations between the results for both groups were concluded high enough for the test to be used in actual shipboard motion simulation trials in a PETER test battery. M S K

A83-20842

**THE FEATURES OF THE BEHAVIOR AND THE DELAYED REACTIONS TO VISUAL AND AUDITORY CONDITIONED STIMULI DURING VARIOUS TIME INTERVALS BETWEEN SIGNALS [OSOBENNOSTI POVEDENIIA I OTSROCHENNYKH REAKTSII NA ZRITEL'NYE I SLUKHOVYE USLOVNYE RAZDRAZHITELI PRI RAZLICHNYKH VREMENNYKH INTERVALAKH MEZHDU SIGNALAMI]**

TS G SUKNIDZE (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol 107, Aug 1982, p 385-387 In Russian refs

Experiments were conducted on dogs in order to determine their reactions to varying the time intervals between two types of conditioned reflex stimuli. Results show that decreasing the time interval between the auditory stimuli from 2-3 min to 15 sec does not influence the behavior or the higher nervous activity of the animals. However, under similar conditions, decreasing the time interval between two visual signals induces significant behavioral changes in the animals, including experimental neurosis. N B

A83-20884

**THE DETERMINATION OF THE FUNCTIONAL RELIABILITY OF PILOTS DURING TRAINING ON A FLIGHT-TRAINING SIMULATOR [OPREDELENIE FUNKTSIONAL'NOI NADEZHNOСТИ LETCHIKA V PROTSESSE TRENIROVOK NA PILOTAZHOM TRENAZHERE]**

V A EGOROV, V A SOKOLOV, and B S FRANTSEN Voenno-Meditinskii Zhurnal, Dec 1982, p 61, 62 In Russian

The endurance of pilots in horizontal flight conditions was studied and the psychophysiological characteristics (emotional stress and reserve attention) were measured for pilots at several levels of experience during tests on a flight-training simulator. Results show that the more experienced pilots had significantly higher parameters of flightworthiness, greater reserve attention, and less emotional stress than the less experienced pilots. However, these differences became significant only when more complex tasks were added to the simulation exercises. No distinctions were observed among the different groups of pilots during normal horizontal flying conditions. It is concluded that the functional reliability of pilots should be tested under flight conditions of more than normal complexity. N B

A83-21074\*

Virginia Polytechnic Inst and State Univ, Blacksburg

**A SENSITIVITY/INTRUSION COMPARISON OF MENTAL WORKLOAD ESTIMATION TECHNIQUES USING A FLIGHT TASK EMPHASIZING PERCEPTUAL PILOTING ACTIVITIES**

J G CASALI and W W WIERWILLE (Virginia Polytechnic Institute and State University, Blacksburg, VA) In International Conference on Cybernetics and Society, Seattle, WA, October 28-30, 1982, Record Conference sponsored by the Institute of Electrical and Electronics Engineers, New York, Institute of Electrical and Electronics Engineers, 1982, p 79-83 refs (Contract NAG2-17)

In a literature review it was found that little research effort has been directly applied to the problem of specifying a viable workload estimation technique for a given pilot/aircrew problem. Furthermore, the relative sensitivity and intrusion of most techniques has not been studied. The present investigation is concerned with a comparative evaluation of eight workload estimation techniques under identical experimental conditions in a flight simulator. The objective of this comparison was to determine the relative sensitivity and intrusion of each estimation technique in applications to a piloting situation which emphasizes the use of perceptual processes. No differential intrusion could be observed, but six of



the eight techniques did show sensitivity to changes in perceptual load. All significant techniques displayed monotonic increases in measured values across the three loading levels considered.

G R

**A83-21075\*** Virginia Polytechnic Inst and State Univ, Blacksburg

**EVALUATION OF THE SENSITIVITY AND INTRUSION OF WORKLOAD ESTIMATION TECHNIQUES IN PILOTING TASKS EMPHASIZING MEDIATIONAL ACTIVITY**

M RAHIMI and W W WIERWILLE (Virginia Polytechnic Institute and State University, Blacksburg, VA) In International Conference on Cybernetics and Society, Seattle, WA, October 28-30, 1982, Record Conference sponsored by the Institute of Electrical and Electronics Engineers, New York, Institute of Electrical and Electronics Engineers, 1982, p 74-78 refs

(Contract NAG2-17)

In this experiment, pilots flew an instrumented moving-base simulator. Medial loading was elicited by having them solve a variety of navigational problems. The problems were sorted into low, medium, and high load conditions based on the number and complexity of arithmetic and geometric operations required to solve them. Workload estimation techniques based on opinion, spare mental capacity, primary task performance, and physiological measures were obtained and compared. This paper describes (1) the ability of the techniques to discriminate statistically between the three levels of loading conditions, and (2) changes in primary task performance caused by introduction of the workload technique procedures and equipment. (Author)

**A83-21076\*** Virginia Polytechnic Inst and State Univ, Blacksburg

**INSTANTANEOUS MENTAL WORKLOAD - CONCEPT AND POTENTIAL METHODS FOR MEASUREMENT**

W W WIERWILLE (Virginia Polytechnic Institute and State University, Blacksburg, VA) Institute of Electrical and Electronics Engineers, International Conference on Cybernetics and Society, Atlanta, GA, Oct 25-28, 1981, Paper 5 p refs

(Contract NAG2-17)

This paper provides an initial conceptual framework for instantaneous workload and describes potential methods for short-term measurement. Many existing estimation techniques can be modified for use as short-term assessment techniques. Techniques in the (1) opinion, (2) spare mental capacity, (3) primary task, and (4) physiological categories are discussed. The limitations involved in instantaneous workload, which are real and fundamental, are also described. (Author)

**A83-22051#**

**PATTERN RECOGNITION APPROACH TO HUMAN SLEEP EEG ANALYSIS AND DETERMINATION OF SLEEP STAGES**

K INOUE, K KUMAMARU, S SAGARA (Kyushu University, Fukuoka, Japan), and S MATSUOKA (University of Occupational and Environmental Health, Japan) Kyushu University, Faculty of Engineering, Memoirs, vol 42, Sept 1982, p 177-195 refs

In this paper, a computer recognition technique of sleep EEG patterns based on a statistical pattern recognition approach is proposed for the purpose of an automatic determination of human sleep stages. An autoregressive model for EEG activity is introduced, and effective feature extraction schemes corresponding to the model are proposed. By using the linear discriminant function method or the Bayes decision rule, various EEG patterns are successfully recognized with high decision accuracy. Furthermore, an automatic determination system of EEG sleep stages based on the statistical pattern recognition approach is constructed. It is confirmed that this method gives satisfactory experimental results comparable to clinician's scoring. (Author)

**A83-22116**

**THE SYSTEMIC QUANTIZATION OF BEHAVIOR [SISTEMNOE KVANTOVANIE POVEDENIIA]**

K V SUDAKOV (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR) Uspekhi Fiziologicheskikh Nauk, vol 14, Jan-Mar 1983, p 3-26 In Russian refs

A theory for the systemic quantization of the behavior of living beings is formulated. The general continuum of behavior is divided into discrete segments, which are directed toward the satisfaction of the primary social or biological needs of humans and animals. The quanta of behavior include the corresponding needs of the organism, the dominating motivation which arises on the basis of these needs, the purposeful activity directed toward the satisfaction of these needs, the intermediate and final results of the activity, and the constant evaluation of the results due to feedback afferentation. Each quantum of behavior is determined by the activity of a specific functional system. The central architecture of any quantum of behavior is isomorphous and includes all the systemic mechanisms established by Anokhin, including afferent synthesis, the decision making, the acceptor of the result of action, efferent synthesis, and the constant comparison of the parameters of the achieved results with the acceptor of the results of action with the utilization of feedback afferentation. Many examples of the systemic quantization of behavior in animals of various phylogenetic levels, as well as in humans, are presented. N B

**A83-22891**

**IMAGE QUALITY AND OBSERVER PERFORMANCE**

I OVERINGTON (British Aerospace Public, Ltd., Co., Dynamics Group, Filton, Glos., England) In Image quality, Proceedings of the Seminar, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p 2-9 refs

An approximate representation of preperceptual image formation and transformation by human vision is presented, with reference to the viewing by human observers of images produced by optical and electrooptical systems. A unified approach to the modeling of visual performance is summarized which takes into account the various display/observer interface factors and attempts to allow for variability in perceptual processes. It is shown how apparently widely disparate approaches to visual performance modeling can be reconciled in terms of this unified approach. B J

**A83-22892**

**DYNAMICS OF PATTERN VISION**

D H KELLY (SRI International, Menlo Park, CA) In Image quality, Proceedings of the Seminar, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p 10-15 refs

(Contract NIH-EY-01128)

Studies in which the natural motions of the retinal image have been eliminated and in some cases replaced by artificial ones (under the control of the investigator) disclose important properties of the visual process. The present paper describes the effects of image stabilization on luminous and chromatic contrast sensitivity and investigates the ways in which sensitivity varies with velocity. The effects of artificial image motion are compared with those of natural eye movements, and some properties of the mechanism responsible for the residual detection of stabilized images are reported. B J

**A83-22893**

**QUALITY METRICS OF DIGITALLY DERIVED IMAGERY AND THEIR RELATION TO INTERPRETER PERFORMANCE**

J J BURKE (Arizona, University, Tucson, AZ) and H L SNYDER (Virginia Polytechnic Institute and State University, Blacksburg, VA) In Image quality, Proceedings of the Seminar, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p 16-23 refs

(Contract F49620-78-C-0055, F49620-80-C-0057)

Hardcopy digital imagery was investigated with respect to subjective image quality. Trained Air Force photointerpreters judged

the interpretability of 250 transparencies (military scenes), displaying a new digital data base consisting of 25 degraded versions (5 blur levels x 5 noise levels) of each of 10 digitized first-generation positive transparencies. The results indicated that noise, blur, and scene content produce differential perceptions of interpretability. The degradations reduced interpretability, many interactions were significant. Other analyses showed that at least 62 categories should be used to scale interpretability, that the correlation between information extraction performance and scale values for digital imagery is high (0.9), and that multidimensional scaling can be used with as yet undetermined utility in investigating image quality. A review of the literature indicates that digital imagery does not appear to be greatly different from standard analog imagery in terms of subjective quality or interpretability. B J

#### A83-22955

**A STUDY OF THE PSYCHOPHYSIOLOGICAL BEHAVIOR IN A GROUP OF AIRLINE PILOTS AFTER THE OPERATIONAL AGE LIMIT /60 YEARS/ [ETUDE DU COMPORTEMENT PHYSIOPSYCHOLOGIQUE D'UN GROUPE DE PILOTES DE LIGNES APRES LA LIMITE D'AGE OPERATIONNEL /60 ANS/]**  
A CASTELLO-BRANCO, A CABRAL SA, and J COELHO-BORGES (TAP Air Portugal, Lisbon, Portugal) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 263-269. In French. refs

#### A83-22957

**PERFORMANCE BASED BIOMEDICAL STANDARDS FOR EVALUATION AIRCREW**  
F S PETTYJOHN and W M HOWK (US Naval Aerospace Medical Center, Naval Aerospace Medical Research Laboratory, Pensacola, FL) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 273-275. refs

The biological requirements for the selection and retention of US military aircrews are examined based on the performance needs of aircraft operational requirements. A classification program to evaluate aircrewmembers during a full military career is developed using three categories of the different aptitudes of 9550 pilots in the US Navy. The first category comprises pilots qualified for all types of combat aircraft, while the second category comprises aviators who are restricted from carrier operations. The third category includes aviators who are restricted from flying single pilot aircraft and who must fly with another rated aviator. The pilots in this last category are limited to flying tanker/transport types of aircraft and are automatically placed in this category upon reaching the age of 45. N B

#### A83-22970

**THE PSYCHOLOGICAL FITNESS OF THE GROUND PERSONNEL IN CHARGE OF AIRSPACE SECURITY DEPENDING ON THE CIVIL AVIATION AUTHORITY EVALUATION AT RECRUITING, DISORDERS OBSERVED DURING THE PERIOD OF EMPLOYMENT [L'APTITUDE PSYCHIQUE DU PERSONNEL AU SOL CHARGE DE LA SECURITE AERIENNE RELEVANT DE LA DIRECTION GENERALE DE L'AVIATION CIVILE - APPRECIATION LORS DU RECRUTEMENT, TROUBLES CONSTATES EN COURS DE CARRIERE]**

J M REYMOND (Direction Generale de l'Aviation Civile, Paris, France), P CAUSSANEL (Ecole Nationale de l'Aviation Civile, Toulouse, France), R NOLLAND (Direction Generale de l'Aviation Civile, Orly Aerogare, Val-de-Marne, France), R SENEGAS (Direction Generale de l'Aviation Civile, Aix-en-Provence, France), and C KAEUFFER (Direction Generale de l'Aviation Civile, Mergnac, Gironde, France) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 366-369. In French.

#### A83-22989

#### PROBLEMS OF PSYCHOPROPHYLAXIS IN PROLONGED MANNED SPACE FLIGHTS

V. I MIASNIKOV and O P KOZERENKO (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Medecine Aeronautique et Spatiale*, vol 21, 4th Quarter, 1982, p 448-450.

The use of psychological support measures during Soviet manned space missions is reviewed. It was found that high emotional stress together with weightlessness induced physiological changes, while other changes were caused by the specific environment, isolation, and confinement. Among the specific psychological support measures utilized in long-term space flights are recordings of films and variety shows, tapes of music, and information from diverse fields, including news in science, culture, sports, and coverage of the space flight. Musical backgrounds seemed to be especially important to the space flight crew and the cosmonauts frequently asked for pieces of music of a rhythmical type. Also important were the establishment of communication with members of the cosmonauts' families, as well as with representatives of different strata of social life. N B

#### A83-23147

#### DETECTION OF VISUAL FORMS IN SPACE AND TIME

M FALZETT and J S LAPPIN (Vanderbilt University, Nashville, TN) *Vision Research*, vol 23, no 2, 1983, p 181-189. refs (Contract NSF-78-05857)

Stationary and moving target forms were composed of 5 equally spaced dots embedded in a background of 600 noise dots, the spatial and temporal separations between the target dots were varied independently. Target detectability decreased linearly with both spatial and temporal separations between the target dots. Detectability of both stationary and moving targets obeyed the same quantitative dependence on total separations, invariant under orientation in space-time. Detection also depended primarily on the relative density of the target and noise rather than on the absolute spatial or temporal separations between target dots. Thus, space and time had interchangeable effects on the detection of both stationary and moving targets. (Author)

#### N83-16362# Joint Publications Research Service, Arlington, Va

#### PAST AND PRESENT OF COSMONAUT TRAINING CENTER

*In its USSR Rept Space*, No 18 (JPRS-82169) p 29-34. 4 Nov 1982. Transl into ENGLISH from *Aviats i Kosmonavt* (Moscow), no 4, Apr 1982, p 40-43. Avail NTIS HC A08/MF A01.

A historical overview of the development of the Soviet cosmonaut training center is presented and the facilities of the present complex are briefly described. M G.

#### N83-17072# Federal Aviation Administration, Atlantic City, N J

#### Technical Center

#### THE MEASUREMENT OF PILOT WORKLOAD Interim Report

E S STEIN and B L ROSENBERG Jan 1983. 54 p. refs (Contract FAA PROJ 161-301-150) (DOT/FAA/EM-81/14, DOT/FAA/CT-82/23) Avail NTIS HC A04/MF A01.

Workload during flight simulation, using two primary variables the pilots' own evaluation sampled one per minute with a computer and the latency or delay of that response was measured. This was supplemented by a postflight questionnaire. Three levels of flight difficulty were established by subject matter experts. These were varied by controlling (1) initial clearance complexity, (2) level of air traffic control, (3) turbulence, and (4) inflight emergency. Flights were conducted in a General Aviation Instrument trainer and 12 pilots participated. Results demonstrated that pilots were willing and able to make inflight workload evaluations which corresponded directly with the induced difficulty level. Response latencies increased in relationship to difficulty, but the intermediate and most difficult flights were not significantly different. Author.

**N83-17073#** Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div

**TO GROW WINGS IN THEIR YOUTH**

Y ZELVENSKIY 26 Aug 1982 14 p Transl into ENGLISH from Krylya Rodiny (USSR), no 7, Jul 1966 p 9-11 (AD-A120593, FTD-ID(RS)T-1099-82) Avail NTIS HC A02/MF A01 CSCL 05I

Indoctrination of cosmonaut and pilot trainees is addressed

Author

**N83-17074#** Army Aeromedical Research Lab, Fort Rucker, Ala Biomedical Applications Research Div

**COMPARISON OF HELICOPTER COPILOT WORKLOAD WHILE USING THREE NAVIGATION SYSTEMS DURING NAP-OF-THE-EARTH FLIGHT Final Report**

D O COTE, R R SIMMONS, and G P KRUEGER Aug 1982 113 p refs Presented at the 37th Ann Forum of the Am Helicopter Soc Document previously announced as A81-46616 (Contract DA PROJ 3E1-62777-A-879) (AD-A120501, USAARL-82-8) Avail NTIS HC A06/MF A01 CSCL 05E

Three different generic navigation systems were examined for their effects on helicopter copilot/navigator workload and performance during nap-of-the-earth (NOE) flight. The navigation systems examined were (1) the conventional 1:50,000 scale topographic hand-held map, (2) a Doppler navigation system in conjunction with a hand-held map, and (3) a projected map system driven by Doppler signals in conjunction with a hand-held map. Eighteen pilots performed copilot/navigator duties in an Army JUH-1H utility helicopter flown by a laboratory research pilot. Data collected included measures of navigation performance, pilot-copilot communications, and copilot/navigator eye movements. The results indicate that automatic navigation systems like the ones used here improve navigation performance by enabling the aircrew to reach their destination with reduced in-flight delays, at a faster airspeed, and with fewer and smaller navigation errors. The number of verbal exchanges between the copilot and pilot was reduced when using the Doppler system versus the hand-held map alone. Subjects who used the Doppler also spent less time navigating. When using a projected map system, copilot/navigators experienced a lower level of visual workload and spent 10% more time looking outside the cockpit. GRA

**N83-17075#** Illinois Univ, Champaign Human Attention Research Lab

**ATTENTION THEORY AND MECHANISMS FOR SKILLED PERFORMANCES**

W SCHNEIDER and A D FISK Jul 1982 21 p refs (Contract N00014-81-K-0034, NR PROJ 154-460) (AD-A119699, HARL-ONR-8201) Avail NTIS HC A02/MF A01 CSCL 05J

Current attentional research and theory are related to the development of skilled performance. Emphasis is given to how performance changes with practice. Dual process attention theory is reviewed examining the distinction between automatic and controlled processing. The changing interactions between automatic and controlled processing in the development of skill are discussed. It is proposed that consistent practice produces automatic productions which perform consistent transformations in a heterarchical system. Automatic productions are proposed to be modular, show high transfer, become resource free, not be under direct control, and be fast, accurate, and coordinated. Controlled processing is assumed to develop automatic processing, maintain strategy and time varying information, and perform problem solving activities. Perceptual data, some motor data, and several motor performance examples are presented to illustrate automatic/controlled processing effects. The relationship to current theories of motor skill are discussed. New research paradigms suggested by the current approach are discussed. Author (GRA)

**N83-17076#** Illinois Univ, Champaign Human Attention Research Lab

**PROCESSING WITH AND WITHOUT LONG-TERM MEMORY MODIFICATION: ATTENTION, LEVEL OF PROCESSING AND WORD FREQUENCY**

W SCHNEIDER and A D FISK Jul 1982 26 p refs (Contract N00014-81-K-0034, NR PROJ 154-460) (AD-A119520, HARL-ONR-8203) Avail NTIS HC A03/MF A01 CSCL 05J

In this research we examine the relationships among long-term memory (LTM) modification, attentional allocation and type of processing. The experiments test the proposal from automatic/controlled processing theory (Schneider and Shiffrin, 1977) that the modification of LTM occurs only during controlling processing and that stimuli can be automatically processed with no resulting LTM effect. Subjects in the first experiment were exposed to words while performing an intentional learning task, a semantic categorization task, a graphic categorization task, a distracting digit search task while trying to remember presented words, or a distracting task while trying to ignore the simultaneous words. In the distracting digit search conditions frequency judgments of words were at or near chance. Distractor learning for the semantic and intentional conditions was better than for graphic orienting, which was better than chance. In the second experiment, subjects were trained for approximately 5,000 trials to develop an automatic categorization response. The results showed no evidence of a frequency estimation ability and little recognition memory for words semantically categorized twenty times. The data support the hypothesis of a close connection between controlled processing and LTM storage and little if any link between automatic processing and LTM storage. GRA

**N83-17077#** Illinois Univ, Champaign Human Attention Research Lab

**AUTOMATIC CATEGORY SEARCH AND ITS TRANSFER: AUTOMATED PROCESS SEMANTIC FILTERING**

W SCHNEIDER and A D FISK Jul 1982 27 p refs (Contract N00014-81-K-0034) (AD-A119519, HARL-ONR-8202) Avail NTIS HC A03/MF A01 CSCL 05I

When subjects receive extended practice searching for words from a consistently mapped (CM) category, search becomes substantially faster, more accurate, and less effortful. The present experiments examine the extent to which category search practice effects are semantically based. Experiment 1a examined improvements in reaction time in detecting words from a category as a function of the number of exemplars (4-12) in the category. All conditions showed improvement, but there was no effect of the number of exemplars. Experiment 1b examined the extent to which training on a subset of exemplars transferred to untrained members of the category. Results showed substantial positive transfer (60 to 92%) to untrained exemplars from the trained category and the transfer was better if there were more exemplars in the training set. Experiment 2a replicated previous results showing that practice reduces resource sensitivity in consistently mapped (CM) category search but does not benefit variably mapped (VM) category search. Experiment 2b examined whether untrained exemplars of a CM trained category would be detected on first presentation when subjects were engaged in a high workload VM digit search task. Untrained exemplars of the CM category were detected on first presentation showing substantial positive transfer (70%). GRA

**N83-17078#** Kansas State Univ., Manhattan Inst for Environmental Research

**DECISION MAKING UNDER HIGH THERMAL STRESS: AN ANNOTATED BIBLIOGRAPHY ON ENVIRONMENTAL STRESSORS AND BEHAVIOR** Report, Sep. 1981 - Aug. 1982  
F H ROHLES, JR, S A KONZ, and R J KROHN Aug 1982 78 p

(AD-A119136, REPT-1, LPN-FEMA-1131B) Avail NTIS HC A05/MF A01 CSCL 06S

This research will study the effects of exposure to the stressors of a simulated survival shelter on decision making. A proposed 5 year effort is summarized that involves a literature search, the development of a test battery to assess the decision making skill, tests in simulated shelters, and the development of strategies to assist in the decision making process. Corollary efforts involve the use of the bicycle ventilating device for charging nickel-cadmium dry cell batteries and relationship between shelter occupant density and shelter occupant numbers. This, the first report of the project, contains an annotated bibliography of the research on the effects upon behavior, of the stressors of temperature, crowding, sleep disturbances, panic, stress, and anxiety. In addition, a survey was conducted which identified 93 problem areas for the survival shelter occupant. These fell equally into three main categories: survival shelter, personal, and environment. GRA

**N83-17079#** Arizona State Univ., Tempe  
**PLANS, CONFIDENCE AND PERFORMANCE: AN ELABORATION OF SELF-EFFICACY THEORY** Ph.D. Thesis

K O MOE May 1982 116 p refs  
(AD-A119091, AFIT-CI-NR-82-40D) Avail NTIS HC A06/MF A01 CSCL 05J

Self-efficacy theory states that performance is best predicted by carefully assessing an individual's self-efficacy expectations. Self-efficacy expectations are the output of a central processor of relevant information. This paper reports the results of two studies which evaluated the possibility of a person's plans for performing a specific behavior having a direct, unmediated effect on performance. One study used dominating a ten minute conversation as the experimental task. For this study, 70 male and 82 female undergraduate students were the subjects. These subjects wrote out plans for dominating a conversation, indicated their satisfaction with their plans, and recorded their self-efficacy expectations for actually dominating the conversation. The subjects for the other study were 107 students in a school for training court reporters. They wrote out plans for taking down and transcribing question and answer testimony. Results of additional analyses suggest that the quality of a person's plan for performance may be helpful in explaining discrepancies between expected and actual performance. GRA

**N83-17080#** University of West Florida, Pensacola Dept of Psychology

**FACTORS INFLUENCING HEMISPHERIC SPECIALIZATION** M.S. Thesis

B J ROYSTER May 1982 39 p refs  
(AD-A118978, AFIT-CI-NR-82-82-47T) Avail NTIS HC A03/MF A01 CSCL 05J

To determine whether hemispheric specialization for visuospacial functions occurs as predicted from existing models of cerebral lateralization processes, 16 participants were bilaterally presented face stimuli using a tachistoscope. Both familiar and unfamiliar faces were utilized with a memory and nonmemory condition for each. Subjects made judgements of 'same' when faces were identical to each other and 'different' when faces were of different persons. As predicted, the reaction times to the unfamiliar memorized faces were significantly faster when the stimuli were presented to the left visual field/right hemisphere. Reaction times to the unfamiliar faces also showed a left visual field/right hemisphere advantage for judgements of different but not for judgements of same. No visual-field differences were found using familiar stimuli for either memory condition or judgement type, indicating that different processes may underlie the analysis of

the two stimulus types in addition to the two judgement types. GRA

**N83-17081#** Naval Training Analysis and Evaluation Group, Orlando, Fla

**AN ASSESSMENT OF THE TRAINING EFFECTIVENESS OF DEVICE 2F64C FOR TRAINING HELICOPTER REPLACEMENT PILOTS**

R F BROWNING, W C MCDANIEL, P G SCOTT, and A F SMODE Jul 1982 155 p

(AD-A118942, TAEG-TR-127) Avail NTIS HC A08/MF A01 CSCL 05I

The effectiveness of flight simulators is heavily dependent on simulator utilization practices. This report presents the first of four planned assessments of the training effectiveness of Device 2F64C in training fleet replacement SH-3 helicopter pilots. GRA

**N83-17082#** Oregon Univ., Eugene Dept of Psychology  
**EXPLORATIONS OF INDIVIDUAL DIFFERENCES RELEVANT TO HIGH LEVEL SKILL** Final Report

S W KEELE and H L HAWKINS 15 Dec 1981 39 p refs

(Contract N00014-77-C-0643, NR PROJ 150-407)

(AD-A120152, TR-7) Avail NTIS HC A03/MF A01 CSCL 05J

Past research has uncovered few broad abilities that underlie high level motor skill. In this paper attempts to isolate three different abilities of potential relevance to skill are described. No evidence was found for a general time-sharing ability in common to different kinds of tasks. Modest evidence was found for a trait of attentional flexibility. That trait could potentially be of use in predicting success on skills that require rapid shifts of attention because of rapidly changing task demands. Finally, the rate of repetitive activity is correlated across different muscle groups. For example, finger tapping speed is correlated with foot tapping speed, suggesting a common rate limiting factor. In turn, those rates predict handwriting speed and, according to Book (1924) championship typing speed. GRA

**N83-17083#** Seville Research Corp., Pensacola, Fla  
**PHASE 1 PILOT STUDY: VTRS TRANSFER OF TRAINING EXPERIMENT** Final Report, May 1981 - Mar. 1982

R N INSLEY and W D SPEARS Mar 1982 55 p

(Contract N61339-80-D-0009)

(AD-A120315, S-TR-82-03, NAVTRAQUIPC-80-D-0009-17-2)

Avail NTIS HC A04/MF A01 CSCL 05J

This report describes a pilot study undertaken during the first phase of a research effort designed to assess the training effectiveness of visual display system variables for aircraft carrier qualification training in the Navy jet undergraduate pilot training program. The purpose of the pilot study is to develop information useful to the development of a recommended experimental design for a full scale transfer of training experiment using the Navy's visual technology research simulator and the T-2 aircraft. Feasibility concerns related to (1) simulator variables, (2) performance assessment, and (3) logistic and administrative problems are addressed. Seven student naval aviators participated in the study. Study results supported other first phase findings that conduct of a full scale transfer of training study is feasible. Author (GRA)

**N83-17084#** Research Inst of National Defence, Stockholm (Sweden)

**LONG RANGE IDENTIFICATION OF SILHOUETTE TARGETS, GIVEN DIFFERENT NUMBERS OF ALTERNATIVE RESPONSES, AND VARYING TARGET SIMILARITY [IDENTIFIERING AV SILUETTMAAL PAA LAANGA AVSTAAND VID VARIERANDE ANTAL SVARSALTERNATIV OCH VARIERANDE LIKHET MELLAN MALEN]**

B MODEER Aug 1982 15 p refs In SWEDISH

(FOA-C-53009-H2) Avail NTIS HC A02/MF A01

Long range identification of two, three or four different vehicles was studied using slide projections with high contrast. Subjects viewed 6 x 80 silhouette pictures at scaled ranges from 4700 to 5800 m. Results show that the number of target alternatives and the similarity among them greatly influence performance.

Silhouettes are less accurately identified when the number of alternatives is high, especially for long ranges. A high number of alternatives also increases attribution of vehicle similarity, causing most of the wrong answers at the shorter range. At the long range identification errors are due to the increase in target similarity, and an increase in the number of targets. Author (ESA)

**N83-17085#** Research Inst of National Defence, Stockholm (Sweden)

**LONG RANGE TARGET IDENTIFICATION OF VEHICULAR SILHOUETTES**

B MODEER Aug 1982 15 p refs Revised  
(FOA-C-53007-H2, FOA-C-56019-H6) Avail NTIS HC A02/MF A01

Long range identification of five vehicles was studied in a laboratory experiment. Silhouette pictures, with high contrast, were viewed at scaled ranges from 3000 to 7200 m. Subjects made 160 observations each. For all vehicles the mean rate of correct identifications was over 50 % up to 5000 m. At longer ranges the differences in performance between the vehicles increase and there is a significant interaction between vehicle and range. At ranges over 5000 m there is a clear tendency to underestimate the target size. It is concluded that the composition of the target array is of great importance for the identification performance. Methodological implications of this are discussed. Author (ESA)

**N83-17086#** Institut de Recherche des Transports, Arcueil (France) Centre d'Evaluation et de Recherche des Nuisances et de l'Energie

**INFLUENCE OF DRIVER BEHAVIOR ON FUEL CONSUMPTION: BIBLIOGRAPHIC STUDY**

G LABIALE May 1982 80 p refs In FRENCH, ENGLISH summary  
(IRT-58, ISBN-2-85782-094-1, ISSN-0150-8997) Avail NTIS HC A05/MF A01

The literature on the effect of different types of driving upon the parameters of mechanical vehicle use and upon fuel consumption, and on the efficiency of indicators and aids to vehicle driving as regards fuel consumption, was studied. The differences in fuel consumption between drivers are between 8 % and 10 %, but can reach 50 % between the extreme consumption levels. The difference of the fuel consumption of the same driver related to different motivations is between 8 % and 23 % but can reach 25 % between the extreme consumption levels. These variabilities of fuel consumption are related to vehicle use parameters such as acceleration, variability of acceleration, normal running of engine, and speed. Research which stresses the analysis of driver behavior and driving strategies, as well as the interaction of the road-vehicle-driver system in order to state fuel consumption and determine economical driving models, is proposed. Author (ESA)

**N83-18192#** Army Intelligence and Threat Analysis Center, Arlington, Va

**MEANS FOR INCREASING THE WORKING CAPACITY OF PERSONS SUBJECT TO EXTENDED SENSORY OVERLOADS**

G I ALEKSEYEV, D V GUSAROV, and Y A SOBOLIN In its Mil Med J, No 8, August 1982 56-60 Aug 1982 refs Transl into ENGLISH from Voenno-Med Zh (Moscow), no 8, 1982 p 38-40  
Avail NTIS HC A07/MF A01

Means for physiological stimulation of the activity of the nervous system in cases of sensory overload were studied. The influence of stimulus of the upper respiratory tract with ammonia on the function of the visual analyzer of man and on muscular fatigue was tested. The functional status of the visual analyzer was evaluated by determining the critical merging frequency of light flashes (CFLF) and the throughput capacity of the analyzer. Author

**N83-18214#** Joint Publications Research Service, Arlington, Va  
**DETERMINATION OF PSYCHOPHYSIOLOGICAL CRITERION FOR PREDICTING EFFECTIVENESS OF THE ADAPTATION PROCESS**

V P LEUTIN and Y I NIKOLAYEVA In its USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 82-86 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 58-62  
Avail NTIS HC A08/MF A01

A criterion for measuring the efficiency of adaptation to an altered environment is presented. The criterion is related to the quantitative evaluation of memory adequacy at early stages of the exposure to a new environment. An improvement in the reproduction of emotional words and a slight deterioration of the recollection of neutral words may be regarded as a prognostically significant criterion of the adaptation success. The lack of an improvement in the reproduction of emotionally important information and a significant deterioration of the recollection of neutral information at the early stages of adaptation is an adverse sign predicting a potential failure of the adaptation process.

M G

**N83-18227#** Joint Publications Research Service, Arlington, Va  
**PSYCHOPHYSIOLOGICAL PILOT TRAINING**

A KOROLEV In its USSR Rept Life Sci Biomed and Behavioral Sci, No 26 (JPRS-82544) p 1-4 28 Dec 1982 Transl into ENGLISH from Vozdushnyy Transport (Moscow), 14 Sep 1982 p 3

Avail NTIS HC A04/MF A01

Pilot training methods are discussed.

N W

**N83-18228#** Joint Publications Research Service, Arlington, Va  
**NEW EMPHASIS ON PILOT PSYCHOLOGY IN CIVIL AVIATION**  
L TSESARKIN In its USSR Rept Life Sci Biomed and Behavioral Sci, No 26 (JPRS-82544) p 5-7 28 Dec 1982 Transl into ENGLISH from Vozdushnyy Transport (Moscow), 5 Oct 1982 p 3

Avail NTIS HC A04/MF A01

Discipline and a lack of self-control, a sense of responsibility for obligations and irresponsibility, a firm word and a lack of reliability. What elicits these or other human actions, what is their cause? How does the psychological climate in a group influence work results? Answers are discussed. Author

**N83-18237#** National Aerospace Lab, Amsterdam (Netherlands)  
Flight Div

**NLR RESEARCH ON PILOT DYNAMICS AND WORKLOAD**

R C VANDEGRAAFF 11 Jan 1982 17 p refs Presented at AIAA/AFFTC/NASA Dryden Workshop on Flight Testing to Identify Pilot Workload and Pilot Dyn, Edwards AFB, Calif, Jan 1982

(NLR-MP-82002-U) Avail NTIS HC A02/MF A07

Pilot performance and workload both in manual and monitoring tasks were studied. Human control behavior, task condition and control effort in terms of modern control theory, as well as the assessment of pilot workload by physiological parameters are described. It is indicated that the optimal control model structure provides a meaningful representation of pilot workload and dynamics in complex control tasks. The results of an in flight helicopter experiment reflect a good correlation between model results, performance and workload measures, measured system performance quantities, subjective effort ratings, and measures of heart rate and respiration. It is found that skin resistance measures are sensitive to uncertainty aspects of the task rather than to the performance aspects. E A K

# MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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**A83-19626**

## SPECTRAL ANALYSIS AND THE INTERFERENCE EMG

N B JONES (Sussex, University, Brighton, England) and P J A LAGO (Porto, Universidade, Oporto, Portugal) IEEE Proceedings, Part A - Physical Science, Measurement and Instrumentation, Management and Education, Reviews, vol 129, pt A, no 9, Dec 1982, p 673-678 Research supported by the Instituto Nacional de Investigacao Cientifica, Fundacao Calouste Gulbenkian, and South East Thames Regional Health Authority refs

A comparison is made between the features observable in the spectrum of the interference EMG and in the spectrum of the turning points of the interference EMG These features are explained, and the two methods are compared In particular, evidence is presented suggesting that it is easier to infer the shapes of the action potentials from the turning-points spectrum, provided that synchronization can be accounted for It is pointed out that spectral analysis of a 0.1 sequence is a rapid procedure that can be made even faster by the use of Walsh spectra instead of Fourier spectra C R

**A83-19627**

## USE OF PHASE SPECTRAL INFORMATION IN ASSESSMENT OF FREQUENCY CONTENTS OF ECG WAVEFORMS

O ROMPELMAN and R J JANSSEN (Delft, Technische Hogeschool, Delft, Netherlands) IEEE Proceedings, Part A - Physical Science, Measurement and Instrumentation, Management and Education, Reviews, vol 129, pt A, no 9, Dec 1982, p 679-683 refs

**A83-19628**

## SIGNAL PROCESSING FOR RECOVERY OF CARDIAC CONDUCTING SYSTEM ACTIVITY

D J WOOLLONS, M J ENGLISH, D CARROLL (Sussex, University, Brighton, England), and R VINCENT (Royal Sussex County Hospital, Brighton, England) IEEE Proceedings, Part A - Physical Science, Measurement and Instrumentation, Management and Education, Reviews, vol 129, pt A, no 9, Dec 1982, p 684-692 Research supported by the Wellcome Foundation and Medical Research Council of England refs

The muscular activity of the heart is co-ordinated and controlled by small electrical signals flowing in the specialised cardiac conducting system Information about these signals, and hence about the integrity of the conducting system, is of increasing diagnostic value The paper describes hardware and software which have been developed for detecting and processing conducting system activity Signals sensed at body surface electrodes or from within the high right atrium are amplified, filtered and subjected to computer processing A suite of programs is available allowing interactive signal analysis with facilities for signal averaging, digital filtering and spectral analysis Results are presented showing pre-atrial signals detected within the high right atrium and His-Purkinje system activity sensed at the body surface. The effects of varying the system bandwidth are examined using digital filtering and spectral analysis (Author)

**A83-19662**

## THE LEARNING BEHAVIOUR OF TRAINEE PILOTS DURING AIRCRAFT-LANDING - A SIMULATOR STUDY [ZUM LERNVERHALTEN VON FLUGSCHUELERN BEI DER LANDUNG - EINE SIMULATORSTUDIE]

W HEUMANN Zeitschrift fuer Flugwissenschaften und Weltraumforschung, vol 6, Nov-Dec 1982, p 391-398 In German Research supported by the Deutsche Forschungsgemeinschaft refs

State-space-trajectories have proved to be a useful means in control theory, especially for characterizing the 'modes' of a system's motion These trajectories are used here to compare the characteristic behavior of pilots with different levels of experience in landing a light airplane It is shown that certain criteria of those trajectories may be used to describe a learning process of inexperienced pilots (Author)

**A83-19950\*** Ohio State Univ, Columbus

## COMPUTER COORDINATION OF LIMB MOTION FOR LOCOMOTION OF A MULTIPLE-ARMED ROBOT FOR SPACE ASSEMBLY

C A KLEIN (Ohio State University, Columbus, OH) and M R PATTERSON (Battelle Columbus Laboratories, Columbus, OH) IEEE Transactions on Systems, Man, and Cybernetics, vol SMC-12, Nov-Dec 1982, p 913-919 refs (Contract NSF ENG-78-18957, NAG1-30)

Consideration is given to a possible robotic system for the construction of large space structures, which may be described as a multiple general purpose arm manipulator vehicle that can walk over the structure under construction to a given site for further work A description is presented of the locomotion of such a vehicle, modeling its arms in terms of a currently available industrial manipulator It is noted that for whatever maximum speed of operation is chosen, rapid changes in robot velocity create situations in which already-selected handholds are no longer practical A step is added to the 'free gait' walking algorithm in order to solve this problem O C

**A83-20326**

## EXPERIMENTAL METHODS AND TECHNIQUES FOR THE INVESTIGATION OF OPERATOR ACTIVITY [METODIKA I TEKHNIKA EKSPERIMENTAL'NYKH ISSLEDOVANIY OPERATORSKOI DEIATEL'NOSTI]

V G VOLKOV, (ED) and A V KOLTSOVA Moscow, Izdatel'stvo Nauka, 1982 176 p In Russian

A collection of studies is presented concerning investigations of the psychophysiological characteristics of humans during different conditions of operator activity Several new methods and devices are developed to measure the psychophysiological condition, in particular the fatigue, of human operators, including indirect methods such as an infrared method to measure the eyelid motion reaction and measurements of speech parameters to determine the level of an operator's fatigue Also investigated are the effects of changes in the hours of a work shift on the work capacity of an operator and the selection of optimum regimes for tracking functions N B

**A83-20327**

## THE ADAPTIVE POSSIBILITIES OF AN OPERATOR IN CONDITIONS OF REDUCED-GRAVITY SIMULATION [K VOPROSU OB ADAPTATSIONNYKH VOZMOZHNOSTIYAKH OPERATORA V USLOVIYAKH MODELIROVANIYA PONIZHENNOI VESOMOSTI]

E K EPISHKIN and V A SHILOVA In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 18-23 In Russian refs

A testing method is proposed for evaluating the stress level of the regulatory mechanisms of a human operator during the process of his adapting to simulated reduced gravity Results show that this method is sufficiently effective for evaluating the stress level of human operators under these conditions In addition, it is found that a change in the structure of sensorimotor activity occurs and the physiological value of its fulfillment rises during the period of



adapting to conditions of reduced gravity Both the level of complexity of the proposed test and the individual psychophysiological characteristics of the operators determine the quality of the discrimination of auditory signals during the period of adaptation. NB

#### A83-20328

**A METHOD FOR THE APPROXIMATE CALCULATION OF THE CURRENT ERRORS OF MISMATCH IN TWO-COORDINATE PURSUIT TRACKING [METOD PRIBLIZHENNOGO VYCHISLENIYA TEKUSHCHEI OSHIBKI RASSOGLASOVANIYA PRI DVUKHKOORDINATNOM PRESLEDUIUSHCHEM SLEZHENII]**

V G VOLKOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 27-31 In Russian

A method is developed for the approximate calculation of the vector modulus of mismatch between two marks on the plane of a display, which shows the pattern of pursuit tracking This method is determined to possess sufficient accuracy for the majority of practical situations and makes it possible to exclude units of nonlinear signal conversion from the analog computer, which significantly simplifies its structural-functional scheme NB

#### A83-20329

**INCREASING THE PERFORMANCE OF HUMAN OPERATORS /REVIEW/ [K VOPROSU POVYSHENIYA NADEZHNOСТИ CHELOVEKA-OPERATORA /OBZOR/]**

V M MASHKOVA In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 32-37 In Russian refs

A review is presented of several methods for increasing the performance of human operators in a man-machine system Attention is focused on methods which directly relate to the activities of the operator, as well as on changes in the work regime which increase the initial performance parameters of the operator and prolong the phase of his reliable functioning NB

#### A83-20332

**THE CHANGE OF PARAMETERS OF THE EYELID MOTION REACTION OF AN OPERATOR DURING PROLONGED WORK [IZMENENIE PARAMETROV VEKODVIGATEL'NOI REAKTSII OPERATORA V PROTSESSE DLITEL'NOI RABOTY]**

M V FROLOV and E P SVIRIDOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 50-55 In Russian

Results are presented for long-term experiments for a group of operators, who were working in a regime of detecting, identifying, and tracking visual signals The behavior of the parameters of the eyelid motion reactions were examined in the operators during periods of work These parameters were then compared with other functional-condition parameters, and also with characteristics of the work activity of the operators It was found that parameters of the eyelid motion reactions are more sensitive than electrophysiological characteristics of the entire functional condition of the operators, such as the EKG and heart rate, although these parameters can be correlated with the more general characteristics It is concluded that the differential analysis of eyelid motion reactions can increase the performance of this function for the routine control and evaluation of the work capacity of operators and also for the investigation of the potential performance of operators NB

#### A83-20333

**THE EFFECT OF THE GRADED MIGRATION OF SLEEP-WAKEFULNESS PERIODS ON THE CONDITION OF A HUMAN AND THE PERFORMANCE OF HIS ACTIVITY AS AN OPERATOR [VLIANIE DOZIROVANNOI MIGRATSII PERIODOV SON-BODRSTVOVANIYA NA SOSTOIANIE CHELOVEKA I NADEZHNOST' EGO OPERATORSKOI DEIATEL'NOSTI]**

V N MALIUGIN, O O RIUMIN, and M L KHACHATURIANTS In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 55-63 In Russian refs

Results are presented for experiments in which the normal schedule of the activities of human operators were varied by 3, 6, 9, and 12 hr The diurnal cycle of the physiological functions, such as the heart rate, breathing rate, and EEG, was examined and the patterns of operator activity were determined according to several psychophysiological tests An evaluation is presented of the effectiveness of the different schedules for the operators NB

#### A83-20334

**METHODS OF THE MEASUREMENT OF CHANGES IN THE FUNCTIONAL SYSTEM OF A HUMAN OPERATOR [K METODAM REGISTRATSII IZMENENII V FUNKTSIONAL'NOI SISTEME CHELOVEKA-OPERATORA]**

E A IVANOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 63-67 In Russian

Experimental results are presented on the effect of four-hour walks on the performance of a human operator who is carrying out visual-motor tracking tasks The method is based on an analysis of shifts in the character of the motor control of the arms Significant changes in the level of several nerve processes in the motor and visual analyzers are detected It is concluded that these changes and especially the pattern of the changes can serve as an objective means of evaluating the degree of fatigue of a human operator NB

#### A83-20338

**A DEVICE FOR INCREASING THE FEEDBACK AND SPEEDING THE PROCESS OF FORMING OCCUPATIONAL HABITS [USTANOVKA DLIA USILENIYA OBRATNOI SVIAZI I USKORENIYA PROTSESSA FORMIROVANIYA PROFESSIONAL'NYKH NAVYKOV]**

V I ZORILE, V I KATKOV, A V CHUNTUL, and P M SHALIMOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 82-87 In Russian refs

An electronic device is developed for relaying information about and increasing the feedback of an operator through a skin analyzer A series of experiments showed that an increase (doubling) in the feedback through the skin analyzer with the aid of a frequency parameter of local vibration was accompanied by a speeding up in the process of forming habits of control and an increase in the quality of work NB

#### A83-20339

**THE EFFECT OF TONAL CONFIRMATION ON THE QUALITY OF CARRYING OUT PURSUIT TRACKING ON A PLANE [VLIANIE TONAL'NOGO PODTVERZHDENIYA NA KACHESTVO VYPOLNENIYA PRESLEDUIUSHCHEGO SLEZHENIYA NA PLOSKOSTI]**

N N LEBEDEVA In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 87-90 In Russian refs

Bisensory stimulation is examined in order to use a doubling of information for increasing the quality of an operator's activity The quality of tracking is elevated by using auditory feedback with respect to mismatch errors, where an increase in error leads to an increase in pulse frequency NB

A83-20340

**THE TRACKING FUNCTION AS A BASIC PSYCHOPHYSIOLOGICAL PARAMETER OF THE ACTIVITY OF AN OPERATOR /REVIEW/ [FUNKTSIIA SLEZHENIIA KAK OSNOVNOI PSIKHOFIZIOLOGICHESKII POKAZATEL' OPERATORSKOI DEIATEL'NOSTI /OBZOR/]**  
V G VOLKOV and V M MASHKOVA In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 91-100 In Russian refs

A review is presented of research concerning the use of the tracking function of an operator for evaluating his psychophysiological condition Attention is focused on mathematical and physical models of the tracking function, and on experimental evaluations of these models Also examined are several experimental devices used to measure and test the tracking function, as well as psychological aspects of the tests to determine the tracking function  
NB

A83-20342

**THE CHANGE IN THE TRACKING FUNCTION DURING CONDITIONS OF PROLONGED MONOTONOUS ACTIVITY [IZMENENIE FUNKTSII SLEZHENIIA V USLOVIYAKH DLITEL'NOI MONOTONNOI DEIATEL'NOSTI]**

N N LEBEDEVA, V N MALIUGIN, and A I SKRYPNIKOV In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 110-115 In Russian refs

Results are presented for an experimental investigation of the dependence of the patterns of an operator's work capacity on the temporal work regime A model of pursuit tracking in a two-coordinate system is used, which provides for constant motor activity with the hands and uninterrupted visual control, and measures mismatches between the visual stimulation and the desired goal According to psychophysiological tests and EEG parameters, it is found that monotonous work for eight hours produces fatigue in the operators, especially during the evening and night shifts, which is probably due to the diurnal rhythms of the operators Even during the morning and day shifts, when the work capacity of the operators is the highest, monotonous work produces deleterious effects on the productive level of the operators  
NB

A83-20343

**AN INFRARED METHOD FOR MEASURING THE EYELID MOTION REACTION [INFRAKRASNYI METOD IZMERENIIA VEKODVIGATEL'NOI REAKTSII]**

G B MILOVANOVA In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 115-119 In Russian

A device is developed which provides a noncontact method for measuring the eyelid motion reaction parameter as a determination of the functional condition of a human operator An evaluation of the functional condition of a human operator is presented using this device and the heart rate parameter It is found that this infrared device can suitably determine the highly informative parameters of the eyelid motion reaction and accurately measure the changes in the working activity of a human operator  
NB

A83-20346

**THE PROCESSING OF SIGNALS OF NEURAL ENSEMBLES USING MODERNIZED ANALYZERS OF THE PULSE-AMPLITUDE TYPE [OBRABOTKA SIGNALOV NEIRONNYKH ANSAMBLEI S POMOSHCH'U MODERNIZIROVANNYKH ANALIZATOROV TIPA AI]**

S S SOKOLOV and E V SERBINA In Experimental methods and techniques for the investigation of operator activity Moscow, Izdatel'stvo Nauka, 1982, p 130-137 In Russian

A device is developed which can analyze the amplitude of biological signals of the type of extracellularly recorded commissural activity of neural populations This device is a modification of the series of pulse-amplitude analyzers AI-256-6 This device can also compute the interval histogram and the correlogram of pulse

sequences, which are isolated from the various signals and are formed with the help of an amplitude-phase-time discriminator  
NB

A83-20389

**HANDBOOK ON ENGINEERING PSYCHOLOGY [SPRAVOCHNIK PO INZHENERNOI PSIKHOLOGII]**

B F LOMOV, (ED) Moscow, Izdatel'stvo Mashinostroyeniye, 1982 368 p In Russian

Topics in engineering psychology are considered, including the psychological and psychophysiological characteristics of human operators, the determination of the effectiveness and reliability of the work of an operator using technical devices, and the engineering and psychological requirements of the work environment Also examined are the engineering and psychological bases of the proposed man-machine system and the engineering and psychological evaluation of this system Information needed to determine the engineering and psychological requirements for the organization of the work of operators is provided, as well as anthropometric, physiological, and other information  
NB

A83-20623

**COCKPIT VISIBILITY AND CONTRAIL DETECTION**

S N ROSCOE (Illiana Aviation Sciences, Ltd, Las Cruces, NM) Human Factors, vol 24, Dec 1982, p 659-672 refs

A series of rooftop and laboratory experiments was conducted to investigate the effects of aircraft cockpit window posts on eye accommodation and the detection of simulated contrails A window post equal in width to the interocular distance of 6.35 cm and one approximately 5 cm wider had comparable effects on accommodation, pulling focus inward from its empty-field resting distance in each case However, the wider post seriously derogated the probability of detecting portions of contrails that appeared in the sectors of monocular visibility on either side, relative to the near-perfect single-look detectability with the nominal standard post width  
(Author)

A83-20624

**USING VISUAL LOBE AREA MEASUREMENTS TO PREDICT VISUAL SEARCH PERFORMANCE**

K-F KRAISS and A KNAEUPER (Forschungsinstitut fuer Anthropotechnik, Wachtberg-Werthhoven, West Germany) Human Factors, vol 24, Dec 1982, p 673-682 refs

After a review of the pertinent literature, a procedure to predict search performance is presented, which is based on visual lobe area measurements The procedure also distinguishes between random and systematic searching strategies A task network model has been worked out that permits one to dynamically simulate visual search with various field sizes, visual lobe areas, and eye-movement characteristics The validity of the proposed predicting method is demonstrated by comparison with experimental data as well as by simulation runs using the prediction model  
(Author)

A83-22064#

**STUDIES ON A VERSATILE HANDLING SYSTEM HAVING MULTIJOINTED FINGERS**

T OKADA Electrotechnical Laboratory, Researches, no. 828, July 1982 86 p In Japanese, with abstract in English refs

A versatile handling system which can perform complicated manual tasks by computer control is described The structure of the handling system and the force control of fingers driven by hose-guided wires is addressed Because of the friction between hose and wire, the force is not transmitted fully to the joint A quantitative analysis of the friction is given, obtaining an equation expressing the dynamical motion of the wire The force controlling method for the torque output of the motor is considered The kinematics of the multi-degrees-of-freedom manipulator is discussed along with a procedure to obtain control input for the manipulator The motion of the fingers is considered as well as the means of controlling them In this analysis, the relative positions of the fingers and the grasped object are held constant Both analytical and experimental results are presented Finally, the

optimum operational direction of the fingers is generally discussed C D

**A83-22237**

**MEASUREMENTS AND IMAGING METHOD OF BLOOD FLOW PROFILE IN HUMAN HEART**

K CHIHARA, Y SAKURAI (Osaka University, Toyonaka, Japan), H MATSUO (Kagawa Medical School, Kagawa, Japan), A KITABATAKE, and H ABE (Osaka University, Osaka, Japan) Electronics and Communications in Japan, vol 64, Dec 1981, p 112-119 Translation Ministry of Education refs (Contract MOE-1-575011)

The development of a noninvasive multichannel pulsed ultrasonic Doppler flowmeter as well as the imaging of blood flow signals for better comprehension of the blood flow profile in the human heart is reported. A new algorithm for discriminating the blood flow direction which is better suited to digital processing is proposed which will enable more accurate results to be obtained. The principle of the flowmeter is analyzed, showing a block diagram, and the data acquisition system is discussed, including the detection of blood flow signals and the multichannel data acquisition. The processing method used in the flowmeter is explained, emphasizing the method of discriminating blood flow direction. Clinical measurement and results are addressed, showing the three-dimensional pattern of mean blood flow velocity, a mapped pattern of mean blood flow velocity for systole and diastole, and computer animation of the power spectrum pattern. Finally, the results of a model flow experiment are described C D

**A83-22568\*** Massachusetts Inst of Tech, Cambridge

**MEASUREMENT OF OCULAR COUNTERROLLING /OCR/ BY POLARIZED LIGHT**

R V KENYON and B K LICHTENBERG (MIT, Cambridge, MA) In Polarizers and applications, Proceedings of the Meeting, San Diego, CA, August 27, 28, 1981 Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p 79-82 refs (Contract NAG2-88)

The assessment of the activation of the otolith gravito-inertial sensors in the vestibular system of the inner ear may be accomplished by observing the ocular counterrolling (OCR) movements which rotate the eyes about the line of sight. A method is presented for the continuous measurement of OCR by means of polarized light, a system of polarizers, and a contact lens. A polarized hard contact lens is placed between two soft lenses before application to the eye, and the measured phase difference between the incident rotating polarized light and the reflected light from this lens provides readings uncontaminated by other eye movement modes O C

**N83-17087\*** Stanford Research Inst, Menlo Park, Calif

**DEVELOPMENT OF A PROTOTYPE AUTOMATIC CONTROLLER FOR LIQUID COOLING GARMENT INLET TEMPERATURE Final Report**

C S WEAVER, B W WEBBON, and L D MONTGOMERY Oct 1982 91 p refs (Contract NAS9-16487, SRI PROJ 3733) (NASA-CR-167782, NAS 1 26 167782) Avail NTIS HC A05/MF A01 CSCL 06K

The development of a computer control of a liquid cooled garment (LCG) inlet temperature is described. An adaptive model of the LCG is used to predict the heat-removal rates for various inlet temperatures. An experimental system that contains a microcomputer was constructed. The LCG inlet and outlet temperatures and the heat exchanger outlet temperature form the inputs to the computer. The adaptive model prediction method of control is successful during tests where the inlet temperature is automatically chosen by the computer. It is concluded that the program can be implemented in a microprocessor of a size that is practical for a life support back-pack E A K

**N83-17088\*** North Carolina State Univ, Raleigh Dept of Soil Science

**PLANT GROWTH IN CONTROLLED ENVIRONMENTS IN RESPONSE TO CHARACTERISTICS OF NUTRIENT SOLUTIONS**

C D RAPER, JR Nov 1982 103 p refs (Contract NCC2-101)

(NASA-CR-166431, NAS 1 26 166431) Avail NTIS HC A06/MF A01 CSCL 06C

Plant growth in controlled environments in response to characteristics of nutrient solutions is discussed. Descriptions of experimental results concerning root acclimation to temperature, root and shoot acclimation to nitrogen stress, and growth response to  $\text{NH}_4(+)$  and  $\text{NO}_3(-)$  nutrition are included. A preliminary model validation to changing temperatures is presented Author

**N83-17089\*** National Academy of Sciences - National Research Council, Washington, D C Committee on Aircraft-Vehicle System Interaction

**AIRCRAFT-VEHICLE SYSTEM INTERACTION. AN EVALUATION OF NASA'S PROGRAM IN HUMAN FACTORS RESEARCH**

1982 41 p refs

(Contract NASW-3455)

(NASA-CR-169650, NAS 1 26 169650) Avail NTIS HC A03/MF A01 CSCL 05H

Research in the areas of man machine interaction and human factors engineering are assessed in relation to improved efficiency and aviation safety. The appropriateness, relevance, adequacy, and timeliness of the research is evaluated, and recommendations are provided regarding the objectives, approach and content S L

**N83-17090\*** Illinois Univ, Urbana Coordinated Science Lab

**AN EXPERT DISTRIBUTED ROBOTICS SYSTEM WITH COMPREHENSION AND LEARNING ABILITIES IN THE AIRCRAFT FLIGHT DOMAIN Semiannual Technical Report, 1 Jan. - 30 Jun. 1982**

D L WALTZ, R T CHIEN, and G F DEJONG Jul 1982 68 p refs

(Contract F49620-82-K-0009, AF PROJ 2304)

(AD-A120184, T-116, AFOSR-82-0879TR) Avail NTIS HC A04/MF A01 CSCL 09B

The authors are focusing on in-flight problem diagnosis. Suppose, for example, a pilot simultaneously experiences over-heating in one engine and aileron reverse. He might attribute the problem to the hydraulic system, but unless he possessed detailed technical knowledge of the particular aircraft, he might not be able to decide which sub-assembly component became disfunctional. However, exactly how and where the problem occurred may have implications for how to deal with it. Indeed, a naively plausible, but wrong, assessment of the problem may lead the pilot to exacerbate rather than improve his situation. On-board intelligent computer system to aid in diagnosis and to suggest corrective measures would be of great help. There are a number of essential attributes of such a system. Such a system raises a number of theoretically important issues of interest to the investigators. Very broadly, the issues are (1) developing computer representations for physical mechanisms, (2) intelligent modeling of those mechanisms, (3) high level natural language communication between humans and computers, and (4) learning from experience and instruction. The remainder of this report is divided into three sections. Each describes the progress reported by one investigator. Several sections contribute to more than one of the four facets of the in-flight diagnosis problem (representation, mechanism modeling, natural language, and learning) GRA

**N83-17091#** Aerospace Medical Research Labs, Wright-Patterson AFB, Ohio. Biomechanical Protection Branch  
**EVALUATION OF THE INFLUENCE OF UPPER EXTREMITY BRACING TECHNIQUES ON HUMAN RESPONSE DURING VERTICAL IMPACT**  
 B F HEARON, J W BRINKLEY, J H RADDIN, JR, L A MCGOWAN, and J M POWERS Aug 1982 225 p refs (Contract AF PROJ 7231)  
 (AD-A120250, AFAMRL-TR-82-54) Avail NTIS HC A10/MF A01 CSDL 06G

A test program was conducted to evaluate the effectiveness of upper extremity bracing techniques during +G sub z impact acceleration. Fifty human impact tests were performed on the Vertical Deceleration Tower up to an impact level of 10.5 G mean (std dev = 0.23), 26 ft/sec velocity change. Subjects were restrained in the operational F-B-111 crew seat and restraint system and were exposed to comparable impacts in different bracing conditions (including the currently recommended crossed-arms position and a proposed, alternate hands-on-knees position) to allow parametric analysis of the test results. Measured data included seat acceleration and velocity, head and chest translational acceleration components, triaxial forces acting on the seat and footrest, forces acting at the restraint harness attachments, and displacements of various body segments. Six of eighteen subjects physically could not perform the crossed-arms brace and thus could not be tested in that position. For the subjects tested in both conditions, seat pan loads were significantly less in the hands-on-knees position than in the crossed-arms position. There was no significant difference in maximum head displacement in the two conditions. On the basis of these findings, it is recommended that the hands-on-knees position be used by F/B-111 ejectees preparing for landing impact of the crew module. It appears that this technique may be utilized by all crewmembers and may afford them greater impact protection than the currently recommended procedure. GRA

**N83-17092#** Pennsylvania State Univ, University Park Biomechanics Lab  
**EFFECTS OF GENDER, LOAD, AND BACKPACK ON THE TEMPORAL AND KINEMATIC CHARACTERISTICS OF WALKING GAIT, VOLUME 3 Final Report, 1 Oct. 1979 - 21 Aug. 1981**  
 P E MARTIN and R C NELSON Natick, Mass Army Natick Labs Apr 1982 81 p refs (Contract DAAK60-79-C-0131, DA PROJ 1L1-62723-AH-98)  
 (AD-A120101, NATICK-TR-82/021-VOL-3) Avail NTIS HC A05/MF A01

This study was conducted to determine the effects of loads worn or carried and the type of backpack used on parameters of the walking gait of men and women. Eleven men and eleven women participated in the test, with walking speed controlled at 4 mi/hr, under each of the following load conditions: Load 1 - baseline (shorts, t-shirt, sneakers), Load 2 - fighting gear (utility shirt and trousers, boots, ALICE fighting gear), Load 3 - combat gear (Load 2 plus PASGT helmet, PASGT armor vest, simulated M16 rifle), Load 4 - combat gear and 20-lb backpack load (Load 3 plus backpack with 20-lb load), Load 5 - combat gear and 35-lb backpack load (Load 4 plus an additional 15 lb in pack). The men were also tested under a sixth load condition: Load 6 - combat gear and 50-lb backpack load (Load 4 plus an additional 30 lb in pack). The subjects carried loads 4 through 6 using four different backpack systems. Two of these consisted of Army frames equipped with the standard Army pack. The third was an experimental item, a packboard made of rigid aluminum, used with the Army pack. The fourth backpack was a commercially-available, internal frame system. The dependent measures analyzed were stride length, rate, and velocity, single leg contact time, double support time, swing time, and trunk angle. Analyses of the data indicated that there was little difference in the trunk angles maintained by the men and the women. Author (GRA)

**N83-17093#** California Univ, Livermore Lawrence Livermore Lab  
**SERVICE LIFE OF RESPIRATOR CARTRIDGES FOR FORMALDEHYDE**  
 G O NELSON, G J CARLSON, and J S JOHNSON 20 Nov 1981 8 p refs (Contract W-7405-ENG-48)  
 (DE82-005111, UCID-19155) Avail NTIS HC A02/MF A01

To date there is no NIOSH approved air purifying respirator which will effectively remove formaldehyde gas. Because of formaldehyde's high vapor pressure, service life values calculated using the adsorption isotherm and Wheeler equations indicate that organic vapor cartridges containing activated carbon will last less than 10 minutes at concentrations greater than 10 ppm. Studies were initiated to identify a suitable sorbent for this potentially dangerous material. The project involves the following steps: develop a method for producing relatively high concentrations (20 ppm) of a formaldehyde test mixture, verify this test concentration using the NIOSH approved chromotropic acid wet chemical technique, and survey a wide variety of sorbents, both plain and impregnated, in hopes of identifying a suitable air purifying cartridge for formaldehyde. A dynamic formaldehyde generation system was fabricated in which formaldehyde was produced by continuously injecting formalin using a syringe pump. DOE

**N83-17094#** Research Inst of National Defence, Stockholm (Sweden)  
**THE KNOWLEDGE TRANSFER IN BIOTECHNOLOGY: SOME RESULTS OF A SURVEY [BIOTEKNOLOGINS KUNSKAPSOEVEFÖRING, NÄGRA RESULTAT AV EN ENKAET]**  
 H FURUSTIG Feb 1982 16 p refs In SWEDISH (FOA-C-56030-H2) Avail NTIS HC A02/MF A01

Users views on problems related to biotechnological informative transmission were reviewed. The evaluation of these indications by ergonomics specialists with regard to documentation, contact activity, systems analysis, ergonomic systems and human factors engineering is discussed. Author (ESA)

**N83-17095#** Research Inst of National Defence, Umea (Sweden)  
**THE USE OF COMPRESSED AIR SYSTEMS IN RELATION TO COMPRESSED AIR MASKS; INVESTIGATION OF DIFFERENT INDUSTRIES [TRYCKLUFTSNAETS LAEMPLIGHET TILL TRYCKLUFTSMASKER. UNDERSOEKNING VID OLIKA INDUSTRIER]**  
 R SUNQVIST Feb 1982 18 p refs In SWEDISH (FOA-A-40038-C2) Avail NTIS HC A02/MF A01

Tests were undertaken in 25 industries for evaluating to what extent the air from compressed air systems was suitable for breathing equipment. Oil mist, in the gas and in the aerosol phase, carbon monoxide content, and humidity were determined and the efficiency of different filters was investigated. Oil-free compressors supplied good breathing air, but air from oil lubricated compressors showed important differences. In most of compressed air systems the oil mist content in the air was lower than the safety threshold value. Several filters polluted the air with oil mist. No carbon monoxide was found. The installation of the suction inlet of the compressors must be taken into account when the air is used for breathing. Author (ESA)

**N83-17096#** Research Inst of National Defence, Stockholm (Sweden)  
**THE ROLE OF BIOTECHNOLOGY IN TECHNICAL SYSTEMS DEVELOPMENT: SOME EXPERIENCES [BIOTEKNOLOGINS ROLL VID TEKNISK SYSTEMUTVECKLING: NÄGRA ERFARENHETER]**  
 H FURUSTIG Sep 1982 66 p refs In SWEDISH (FOA-C-56032-H2) Avail NTIS HC A04/MF A01

Literature on the influence of human factors in technical systems development was reviewed. Success and failure in implementing changes in job design, man-machine systems, military experience, trade studies, civil experience, and social factors are discussed.

Lack of knowledge or inadequate knowledge transfer in biotechnological systems development leads to difficulties in personnel training and can cause safety, layout, and utilization problems  
Author (ESA)

**N83-17394\*#** Alabama Univ, Huntsville Dept of Psychology  
**AUTONOMOUS ONBOARD CREW OPERATIONS: A REVIEW AND DEVELOPMENTAL APPROACH**

J G ROGERS /in NASA Marshall Space Flight Center The 1982 NASA/ASEE Summer Fac Fellowship Program 29 p Aug 1982 refs  
Avail NTIS HC A99/MF A01 CSCL 05H

A review of the literature generated by an intercenter mission approach and consolidation team and their contractors was performed to obtain background information on the development of autonomous operations concepts for future space shuttle and space platform missions. The Boeing 757/767 flight management system was examined to determine the relevance for transfer of the developmental approach and technology to the performance of the crew operations function. In specific, the engine indications and crew alerting system was studied to determine the relevance of this display for the performance of crew operations onboard the vehicle. It was concluded that the developmental approach and technology utilized in the aeronautics industry would be appropriate for development of an autonomous operations concept for the space platform.  
M G

**N83-17469#** United Air Lines, Inc, Denver, Colo  
**PILOT/AIRCRAFT FUEL PERFORMANCE EVALUATION**

G A MCKINZIE /in DOE Symp on Com Aviation Energy Conserv Strategies p 281-306 Apr 1981  
Avail NTIS HC A17/MF A01 CSCL 01B

Methods in four areas which determine (1) the extent of fuel consumption, (2) the manner in which this information is used to forecast fuel usage, (3) present measuring systems, and (4) goals and the ways they can be developed and tracked, are discussed. The four methods for fuel measurement information cover four areas: pilots, flight management, top management, and outside agencies. The development of accountability systems for how and where all fuel is consumed is recommended.  
E A K

**N83-17495#** Air Force Inst of Aviation Medicine, Fuerstenfeldbruck (West Germany)  
**HUMAN FACTORS**

G O SPOHD /in AGARD Human Factors Aspects of Aircraft Accidents 18 p Oct 1982 refs  
Avail NTIS HC A07/MF A01

The complex relations of factors causing man to fail in military aviation are reduced to a simple model. Basic connections between the several components of a controller, computer and decision maker are drawn and applied step by step to the aviator's conditions. Man's abilities and qualifications for the perception of cues are discussed, their importance in the field of aviation indicated. The importance of human engineering, display and control design including information presentation is related to aviation, basic principles for the development of future design are listed. Physiological factors and their importance on pilots' performance capabilities as well as psychological factors like alterations in attention, arousal and motivation, and the aviator's need for decision making are discussed. Problems of aircrew selection, crew monitoring, crew training and performance supervision, in combination with suggestions for improvement, and an accident zone model, based on a recent study within the GAF, are included.  
Author

**N83-17498#** Royal Air Force Inst of Aviation Medicine, Farnborough (England)  
**LIFE SUPPORT, RESTRAINT AND EJECTION SYSTEMS INVESTIGATION**

D J ANTON /in AGARD Human Factors Aspects of Aircraft Accidents 7 p Oct 1982 refs  
Avail NTIS HC A07/MF A01

The examination of life support, restraint and ejection systems is an integral part of the investigation of any aircraft accident. It is important that it should be conducted in a thorough manner and particular care should be taken in the field phase of the investigation as much of that evidence is, by its nature, ephemeral.  
Author

**N83-18225#** Joint Publications Research Service, Arlington, Va  
**CHANGES IN SOME BIOCHEMICAL PARAMETERS OF BLOOD AS A FUNCTION OF PROGRAM OF ACCELERATIONS**

J DOMACZUK /in its USSR Rept Space Biol and Aerospace Med, Vol 16, No 6, Nov - Dec 1982 (JPRS-82654) p 131-134 17 Jan 1983 refs Transl into ENGLISH from Kosmich Biol i Aviakosmich Med (Moscow), v 16, no 6, Nov - Dec 1982 p 87-89  
Avail NTIS HC A08/MF A01

Resistance to accelerations can be characterized by both the maximum acceleration achieved and duration of exposure to a specified level of accelerations. As a rule, resistance to accelerations is evaluated with the use of centrifuges. As we know, accelerations elicit hemodynamic disorders, which result in hypoxia. Under such conditions, there is also impairment of biochemical processes. The objective there was to examine the end metabolic products in animals, in whom accelerations elicited bradycardia upon reaching maximum endurance, due to both duration of exposure (time program) and magnitude of accelerations (linear program).  
B W

**N83-18238\*#** National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md  
**HUMAN FACTORS CONSIDERATIONS IN SYSTEM DESIGN**

C M MITCHELL, ed (George Mason Univ), P M VANBALEN, ed (George Mason Univ), and K L MOE, ed Jan 1983 381 p refs Symp held in Greenbelt, Md and College Park, Md, 25-26 May 1982 (Contract NAS5-26952) (NASA-CP-2246, NAS 1 55 2246) Avail NTIS HC A17/MF A01 CSCL 05H

Human factors considerations in systems design was examined. Human factors in automated command and control, in the efficiency of the human computer interface and system effectiveness are outlined. The following topics are discussed: human factors aspects of control room design, design of interactive systems, human computer dialogue, interaction tasks and techniques, guidelines on ergonomic aspects of control rooms and highly automated environments, system engineering for control by humans, conceptual models of information processing, information display and interaction in real time environments.

**N83-18239\*#** Johns Hopkins Univ, Baltimore, Md Dept of Psychology  
**INTRODUCTION TO HUMAN FACTORS CONSIDERATIONS IN SYSTEM DESIGN**

A CHAPANIS /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 11-24 Jan 1983 refs  
Avail NTIS HC A17/MF A01 CSCL 05H

A definition for human factors or ergonomics and its industrial and domestic application is presented. Human factors engineering, which discovers and applies information about human abilities, limitations, and other characteristics to the design of tools, machines, systems, tasks, jobs, and environments for safe, comfortable, and effective human use, is outlined. The origins of human factors and ergonomics, the philosophy of human factors, goals and objectives, systems development and design, are reviewed.  
E A K

**N83-18240\*#** Nuclear Regulatory Commission, Washington, D C Human Factors Branch

**HUMAN FACTORS ASPECTS OF CONTROL ROOM DESIGN**

J P JENKINS /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 27-46 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

A plan for the design and analysis of a multistation control room is reviewed. It is found that acceptance of the computer based information system by the users in the control room is mandatory for mission and system success. Criteria to improve computer/user interface include match of system input/output with user, reliability, compatibility and maintainability, easy to learn and little training needed, self descriptive system, system under user control, transparent language, format and organization, corresponds to user expectations, adaptable to user experience level, fault tolerant, dialog capability, user communications needs reflected in flexibility, complexity, power and information load, integrated system, and documentation. E A K

**N83-18241\*#** George Washington Univ, Washington, D C Dept of Electrical Engineering and Computer Science

**HUMAN-COMPUTER DIALOGUE: INTERACTION TASKS AND TECHNIQUES. SURVEY AND CATEGORIZATION**

J D FOLEY /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 91-106 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

Interaction techniques are described. Six basic interaction tasks, requirements for each task, requirements related to interaction techniques, and a technique's hardware prerequisites affective device selection are discussed. E A K

**N83-18242\*#** National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md

**PRELIMINARY REPORT OF GODDARD/UNIVERSITY HUMAN FACTORS RESEARCH GROUP**

W TRUSZKOWSKI /in its Human Factors Considerations in System Design p 109-126 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

The three major concerns which greatly influence the initial efforts and priorities in the human factors arena are outlined. These concerns are an increased awareness of the (1) overriding data driven aspects of current command/control systems, (2) complexity of existing man/system interface mechanisms, and (3) great extent of the manual intervention required in present systems. E A K

**N83-18243\*#** George Mason Univ, Fairfax, Va  
**GUIDELINES ON ERGONOMIC ASPECTS OF CONTROL ROOMS**

C M MITCHELL, A K BOCAST, and L J STEWART /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 129-202 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

The anthropometry, workstation design, and environmental design of control rooms are outlined. The automated interface and VDTs and displays and various modes of communication between the system and the human operator using VDTs are discussed. The man in the loop is examined, the single controller single task framework and multiple controller multiple tasks issues are considered. E A K

**N83-18244\*#** Computer Technology Associates, Arlington, Va Space Systems Analysis

**A CASE STUDY OF A SYSTEM ENGINEERED FOR CONTROL BY HUMANS**

J ROTHENBERG /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 205-214 Jan 1983

Avail NTIS HC A17/MF A01 CSCL 05H

Alternatives to the traditional concepts for real time health and safety operations were examined. The pitfalls of the conventional contingency planning for health and safety are highlighted. The Solar Maximum Mission (SMM) contingency planning and

operations provides the evolution from the conventional people intensive health and safety operation, toward a night watchman mode of operations. The SMM spacecraft health and safety operations were budget constrained to the point that one operator was responsible for the health and safety of the entire spacecraft one week after launch. The spacecraft was a protoflight with brand new subsystem configurations, software and procedures. To manage the risks associated with this one man SMM health and safety operation, the real time contingency planning and operations centered around unambiguously identifying a system level problem, and reactively safing components susceptible to unrecoverable damage. The methodology applied to both analyzing and implementing this approach of SMM is shown. E A K

**N83-18245\*#** George Mason Univ, Fairfax, Va Dept of Psychology

**CONCEPTUAL MODELS OF INFORMATION PROCESSING**

L J STEWART /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 217-238 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

The conceptual information processing issues are examined. Human information processing is defined as an active cognitive process that is analogous to a system. It is the flow and transformation of information within a human. The human is viewed as an active information seeker who is constantly receiving, processing, and acting upon the surrounding environmental stimuli. Human information processing models are conceptual representations of cognitive behaviors. Models of information processing are useful in representing the different theoretical positions and in attempting to define the limits and capabilities of human memory. It is concluded that an understanding of conceptual human information processing models and their applications to systems design leads to a better human factors approach. E A K

**N83-18246\*#** George Washington Univ, Washington, D C Dept of Electrical Engineering and Computer Science

**TOP-DOWN METHODOLOGY FOR HUMAN FACTORS RESEARCH**

J SIBERT /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 241-255 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

User computer interaction as a conversation is discussed. The design of user interfaces which depends on viewing communications between a user and the computer as a conversation is presented. This conversation includes inputs to the computer (outputs from the user), outputs from the computer (inputs to the user), and the sequencing in both time and space of those outputs and inputs. The conversation is viewed from the user's side of the conversation. Two languages are modeled: the one with which the user communicates with the computer and the language where communication flows from the computer to the user. Both languages exist on three levels, the semantic, syntactic and lexical. It is suggested that natural languages can also be considered in these terms. E A K

**N83-18247\*#** George Mason Univ, Fairfax, Va Decision Sciences Faculty

**THE HUMAN AS SUPERVISOR IN AUTOMATED SYSTEMS**

C M MITCHELL /in NASA Goddard Space Flight Center Human Factors Considerations in System Design p 259-290 Jan 1983 refs

Avail NTIS HC A17/MF A01 CSCL 05H

This hierarchical approach to information display forces the development of a set of human oriented system models which will guide the design of the displays. If the appropriate information is provided at the appropriate time, it is likely that less information will be displayed at any given time, and the quality of the displayed information will require less operator effort to integrate into an assimilable form. A problem with contemporary control rooms is that there is too much information for an operator to be able to



assimilate quickly, easily, and accurately. It is suggested that necessary direction for research in the area of automated control room design is to develop displays which provide active decision aiding for the modern controller. Displays are needed which provide information compatible with the operator's current internal model, filter out irrelevant information, and summarize and condense lower level information. E A K

**N83-18248\*#** National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md  
**ERBS HUMAN FACTORS ANALYSIS: A CASE STUDY**  
K L MOE and C WEGER (Computer Sciences Corp) *In its* Human Factors Considerations in System Design p 293-300 Jan 1983  
Avail NTIS HC A17/MF A01 CSCL 05H

The incorporation of human factors into the system development process and the benefits derived are discussed. The human factors analysis task for the Earth radiation budget satellite (ERBS) payload operations control center (POCC) is a pathfinder in the new applications approach to this discipline within the mission and data operations directorate. The topics covered include discussions of the motivation for human factors analysis, the involvement of the human factors research group (HFRG) with project and system developers, and some examples of human factors issues addressed in the ERBS analysis task. E A K

**N83-18249\*#** George Washington Univ, Washington, D C Dept of Psychology  
**MECHANICS OF CONDUCTING A TASK ANALYSIS**  
V RAPPOLO *In* NASA Goddard Space Flight Center Human Factors Considerations in System Design p 303-318 Jan 1983 refs  
Avail NTIS HC A17/MF A01 CSCL 05H

Task analysis (TA) which is a set of analytical procedures used to describe human work in terms of tasks is discussed. The method of TA was derived from various techniques of methods analysis of the industrial engineers. The topic of TA is organized around the following main areas: (1) a detailed discussion of what a TA is, (2) the uses of TA, (3) evaluation of the TA procedure and an assessment of the procedure's worth. E A K

**N83-18250\*#** George Mason Univ, Fairfax, Va Decision Sciences Faculty  
**INFORMATION DISPLAY AND INTERACTION IN REAL-TIME ENVIRONMENTS**  
A K BOCAST *In* NASA Goddard Space Flight Center Human Factors Considerations in System Design p 321-358 Jan 1983 refs  
Avail NTIS HC A17/MF A01 CSCL 05H

The available information bandwidth as a function of system's complexity and time constraints in a real time control environment were examined. Modern interactive graphics techniques provide very high bandwidth data displays. In real time control environments, effective information interaction rates are a function not only of machine data technologies but of human information processing capabilities and the four dimensional resolution of available interaction techniques. The available information bandwidth as a function of system's complexity and time constraints in a real time control environment were examined. E A K

**N83-18251\*#** Essex Corp, Huntsville, Ala  
**HUMAN OPERATOR PERFORMANCE OF REMOTELY CONTROLLED TASKS: TELEOPERATOR RESEARCH CONDUCTED AT NASA'S GEORGE C. MARSHALL SPACE FLIGHT CENTER Summary Report, 1971 - 1981**  
N SHIELDS, JR, F PICCIONE, M KIRKPATRICK, III, and T B MALONE Mar 1982 96 p refs  
(Contract NAS8-31848)  
(NASA-CR-170716, NAS 1 26 170716, H-82-01) Avail NTIS HC A05/MF A01 CSCL 05H

The capabilities within the teleoperator laboratories to perform remote and teleoperated investigations for a wide variety of applications are described. Three major teleoperator issues are

addressed: the human operator, the remote control and effecting subsystems, and the human/machine system performance results for specific teleoperated tasks. S L

**N83-18252\*#** Essex Corp, Huntsville, Ala  
**HUMAN OPERATOR PERFORMANCE OF REMOTELY CONTROLLED TASKS: TELEOPERATOR RESEARCH CONDUCTED AT NASA'S GEORGE C. MARSHALL SPACE FLIGHT CENTER. EXECUTIVE SUMMARY Summary Report, 1971 - 1981**  
N SHIELDS, JR, F PICCIONE, M KIRKPATRICK, III, and T B MALONE Mar 1982 27 p refs  
(Contract NAS8-31848)  
(NASA-CR-170717, NAS 1 26 170717, H-82-01) Avail NTIS HC A03/MF A01 CSCL 05H

The combination of human and machine capabilities into an integrated engineering system which is complex and interactive interdisciplinary undertaking is discussed. Human controlled remote systems referred to as teleoperators, are reviewed. The human factors requirements for remotely manned systems are identified. The data were developed in three principal teleoperator laboratories and the visual, manipulator and mobility laboratories are described. Three major sections are identified: (1) remote system components, (2) human operator considerations, and (3) teleoperator system simulation and concept verification. E A K

**N83-18253\*#** Essex Corp, Huntsville, Ala  
**EARTH ORBITAL TELEOPERATOR SYSTEM EVALUATION: TEST REPORT, 1979 - 1980 Interim Report**  
Jan 1981 80 p refs  
(Contract NAS8-31848)  
(NASA-CR-170718, NAS 1 26 170718, H-81-01) Avail NTIS HC A05/MF A01 CSCL 05H

Areas which have significant influence upon the engineering design of an operational teleoperator are addressed. Teleoperator lighting systems, thruster systems, and stereoptic visual systems are discussed. The effects of specified levels of several teleoperator subsystems on human operator performance are determined. Four evaluations are reviewed, each dealing with operator performance under various task conditions. A L

**N83-18254\*#** National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex  
**LOWER BODY NEGATIVE PRESSURE APPARATUS Patent Application**  
W E THORNTON, inventor (to NASA) 2 Sep 1982 24 p  
(NASA-CASE-MSC-20202-1, US-PATENT-APPL-SN-414106)  
Avail NTIS HC A02/MF A01 CSCL 05H

A method and apparatus for simulating gravitational forces on a living organism are described wherein a series of negative pressures are externally applied to successive lengthwise sections of a lower limb of the organism, the pressures decreasing progressively with distance of the limb sections from the heart of the organism. A casing defines a chamber adapted to contain the limb of the organism and is rigidified to resist collapse upon the application of negative pressures to the interior of the chamber. Seals extend inwardly from the casing for effective engagement with the limb of the organism and, in cooperation with the limb, subdivide the chamber into a plurality of compartments each in a negative pressure communicating relation with the limb. Controls apply negative pressures to the compartment and maintain the negative pressures at incrementally different levels in respective ones of the compartments. NASA

**N83-18255#** Army Aeromedical Research Unit, Fort Rucker, Ala Biomedical Applications Research Div  
**PHYSIOLOGICAL IMPACT OF WEARING AIRCREW CHEMICAL DEFENSE PROTECTIVE ENSEMBLES WHILE FLYING THE UH-1H IN HOT WEATHER** Final Report, Nov. 1980 - Aug. 1982  
 F S KNOX, III, G A NAGEL, B E HAMILTON, R P OLAZABAL, and K A KIMBALL Oct 1982 84 p refs  
 (Contract DA PROJ 3E1-62777-A-878)  
 (AD-A121581, USAARL-83-4) Avail NTIS HC A05/MF A01  
 CSDL 06Q

Six recent graduates of initial entry rotary wing training flew a UH-1H for up to 4 hours while wearing each of three clothing ensembles. Each aviator wore the standard flight suit, the US chemical defense (CD) ensemble, and the United Kingdom CD ensemble in hot weather (mean WBGT 29 C). Skin temperatures (chest, thigh, upper arm and calf), rectal temperature, heart rate, and preflight and postflight body weights were recorded. Three of six aviators terminated flight for medical reasons (heart rates > 140 bpm or nausea) while wearing the US ensemble. Well acclimatized aviators in this study who did not preflight and drank water every hour were able to fly for at least 2 hours (one fuel load) before the most susceptible subjects had to terminate flight due to heat stress. Heart rate was the most susceptible subjects had to terminate flight due to heat stress. Heat rate was the most sensitive indicator of this stress. In this study, these susceptible subjects tended to be older and heavier. Although no measures of cardiopulmonary fitness (e.g., V sub 02 max) were made, it may be that these susceptible subjects were somewhat less fit. The US ensemble was somewhat more stressful than the UK or standard ensembles. Subjectively all subjects preferred the AR5 respirator to the M24 mask, were divided on overgarment vs undergarment, and most disliked the US overboots. As a caveat it should be stated that fitness alone is not likely to be sufficient to overcome the heat stress induced by these ensembles as flight times are extended. Some sort of cooling will probably be needed. Author (GRA)

**N83-18256#** California Univ, Berkeley Lawrence Berkeley Lab Lighting Systems Research  
**RELATING PRODUCTIVITY TO VISIBILITY AND LIGHTING**  
 R CLEAR and S BERMAN Jan 1982 24 p refs Presented at the Public Works Can Symp on The Integration of Visual Performance Criteria into the Illumination Design Process, Ottawa, 25-27 Jan 1982  
 (Contract W-7405-ENG-48)  
 (DE82-008598, LBL-13931, CONF-820141-1, EEB-L-82-03)  
 Avail NTIS HC A02/MF A01

The problem of determining the appropriate light levels for visual tasks is a cost benefit problem. Existing light level recommendations seriously underweigh the importance of economic factors. Furthermore, the relative importance of the visibility factors is determining the optimal light levels appears inconsistent with the importance of these factors in determining visibility and visual performance. It is shown that calculations based on acuities give a lower limit of 100 to 200 lux for cost effective light levels for office tasks. Upper limits are calculated from correlations of task performance to visibility levels. Visibility levels become progressively insensitive to luminance as luminance increases. Average power densities above 100 watts per square meter are cost effective only when visibility is very low. However, there is a 3 to 10 times larger increase in benefits from improving contrast or contrast sensitivity than from using more than 10 watts DOE.

**N83-18257#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)  
**ADVANCED AVIONICS AND THE MILITARY AIRCRAFT MAN/MACHINE INTERFACE**  
 Jul 1982 341 p refs In ENGLISH and FRENCH Meeting held in Blackpool, England, 26-29 Apr 1982  
 (AGARD-CP-329, ISBN-92-835-0315-4) Avail NTIS HC A15/MF A01

The interfacing of air crews of modern military aircrafts with advanced avionics equipment and systems were discussed. Topics

include (1) use of new advanced displays in aircraft, including multicolor displays, displays incorporating optical techniques, and more reliable display systems, (2) use of voice input/output systems for man machine interface, including speech synthesis, (3) complex avionics systems management, and (4) tactile control and their use.

**N83-18258#** Royal Aircraft Establishment, Farnborough (England)  
**HUMAN FACTORS IMPLICATIONS OF NEW AVIONIC TECHNIQUES**  
 F G CUMMING and J LAYCOCK In AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 4 p Jul 1982  
 Avail NTIS HC A15/MF A01

Advances in technology particularly in the microelectronics industry which have created a situation where the avionics systems designer has at his disposal a greater number of design options than before, giving him the capability of constructing systems that are more complex than any previously envisaged are discussed. The new techniques available should not only improve on already existing systems but new ideas can be precisely tailored to the pilot's requirements in a way which has not been possible up till now. The pilot will be retained in aircraft of the future because of his unique ability to make decisions in unanticipated situations and for his visual systems capacity to search, detect and recognize visual information present in the outside world. To maximize efficiency the avionic systems should allow unambiguous signals to be passed through his limited capacity channel to produce the minimum number of motor control actions at the output. This may be achieved by (1) reducing the number of times he is required to close the display/control loop by providing an improved flight control system and a better correlation between the instruments and the outside world, (2) reducing the number of selections of data sources that are required throughout the sortie by introducing automated procedures to take care of plant failures, and providing a more easily operable interface to allow essential interaction with the various systems to be made both fast and accurately. E A K

**N83-18259#** Direction des Recherches Etudes et Techniques, Paris (France) Delegation Generale pour l'Armement  
**THE HUMAN FACTOR IN SYSTEMS HANDLING [LE FACTEUR HUMAIN DANS LE PILOTAGE DES SYSTEMES]**  
 J C WANNER In AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 12 p Jul 1982 In FRENCH  
 Avail NTIS HC A15/MF A01

The rules which allow improvement of flight systems security in human factors are just as useful in human performance in man machine interfaces. The security rules were enforced at the certification of the Concord supersonic airplane and were reviewed after a human behavior study for loopholes in the enforcement of the system. E A K

**N83-18260#** Royal Aircraft Establishment, Farnborough (England)  
**HUMAN FACTORS CONSIDERATIONS OF THE PERCEPTION OF COLOUR IN THE AIRBORNE ENVIRONMENT**  
 C P GIBSON and J LAYCOCK In AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 9 p Jul 1982 refs  
 Avail NTIS HC A15/MF A01

The various CRT technologies in relation to the CIE system of color measurement and the applications and possible pitfalls associated with the use of color as a means of encoding information are discussed. It is suggested that CRTs will become the prime, and certainly the most flexible, display medium in the modern cockpit. The human factors aspects of the use of color are crucial if optimum advantage is to be made of this coding dimension since many areas remain relatively unexplored. The basic mechanisms, and some of the anomalies, of color perception are presented and illustrated. Psychological effects such as the change of perceived hue with luminance, the perceived changes caused by simultaneous color contrast and the effects of chromatic adaptation are outlined. E A K.

**N83-18261#** Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France) Dept de Physiologie et Ergonomie Aerospatiales

**THE ROLE OF COLOR IN THE SYMBOLS OF AIRCRAFT CONTROL [ROLE DE LA COULEUR DANS LA SYMBOLOGIE DE PILOTAGE DES AERONEFS]**

J P MENU and G F SANTUCCI /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 11 p Jul 1982 refs In FRENCH

Avail NTIS HC A15/MF A01

The presentation of numerous colors can hinder or confuse the grasp of visual information. Several important rules must be set down for using color on supports integrated in a more general concept of piloting and navigation. The vocabulary of photocolourimetry and available techniques are described with emphasis on the cathode ray tube. The correct use of color and the influence of certain environments on color perception are discussed. Physiological problems associated with the use of cathode ray tubes in aeronautics are examined. A R H

**N83-18262#** Air Force Wright Aeronautical Labs, Wright-Patterson AFB, Ohio Flight Dynamics Lab

**COLOR DISPLAY FORMATS: A REVOLUTION IN COCKPIT DESIGN**

J M REISING and T J EMERSON /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 11 p Jul 1982 refs

Avail NTIS HC A15/MF A01

Pictorial formats that take full advantage of available graphics and color are discussed. These formats enable the pilot to have entirely new views of his situation. Color formats were developed for head up and head down flight, stores management, and engine and systems monitoring, both in the normal and emergency state. By properly designing pictorial formats to give the pilot a more natural, intuitive view of both the outside world and his aircraft systems, he will become convinced of their utility, and the transition into the electro-optical, full color cockpit will be hastened. E A K

**N83-18263#** Plessey Co Ltd, Romsey (England) Systems Research Dept

**THE ASSESSMENT OF COLOUR IN LOFARGRAM DISPLAYS**

J METCALFE /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 4 p Jul 1982 refs Sponsored in part by Ministry of Defense of the United Kingdom

Avail NTIS HC A15/MF A01

The usefulness of multiple colors in CRT displays was assessed. The assessments performed using Lofargram displays are presented. Three phases are reported: (1) the provision of display equipment, (2) an initial pairs comparison assessment, (3) a final operator trial assessment. It is concluded that multiple colors in the type of display under consideration are not more useful in CRT's than monochrome green. E A K

**N83-18264#** Midwest Systems Research, Inc., Dayton, Ohio  
**ADVANCED DISPLAY FOR COMPLEX FLIGHT TRAJECTORIES**

P B LOVERING and S B BURDESS (RAF Staff College) /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 4 p Jul 1982 refs

Avail NTIS HC A15/MF A01

Cockpit control and display problems were revealed of complex approach trajectories in support of the Microwave Landing System (MIS) Program. A color graphics display aimed at finding some viable solutions was initiated. The test display format, designed specifically to address orientation and lateral control aspects of the precision approach problem, contained a map display of the approach profile, aircraft attitude, flight direction commands for pitch and a 24 second lateral path predictor. Four colors, green, blue, orange and white were used on a black background for the display elements. Objective performance concerning the desired flight path and pilot opinion on each of the new display features are presented. E A K

**N83-18265#** Rome Air Development Center, Griffiss AFB, N Y Communications Div

**OVERVIEW OF STATE-OF-THE-ART, R&D NATO ACTIVITIES, AND POSSIBLE APPLICATIONS-VOICE PROCESSING TECHNOLOGY**

B BEEK /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 15 p Jul 1982 refs

Avail NTIS HC A15/MF A01

Voice interactive systems and its role in military applications are discussed. The history and evolution of automatic speech recognition and synthesis is briefly explored and the current state of the art is reviewed. The term voice interactive systems is defined and the advantages and disadvantages of voice interactive systems are highlighted. Previous applications of speech systems to military problems are summarized, the major application areas are described. Important issues to consider when applying voice interactive systems to the aircraft environment are summarized.

E A K

**N83-18266#** Fraunhofer-Inst fuer Informations- und Datenverarbeitung, Karlsruhe (West Germany)

**CHARACTERISTICS OF THE HUMAN INFORMATION CHANNELS AND CONCLUSIONS FOR VOICE INPUT/OUTPUT**

H MUTSCHLER /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 8 p Jul 1982 refs Sponsored in part by German Federal Ministry of Defence

Avail NTIS HC A15/MF A01

Input and output in man machine communication and the specific characteristics of the human oral and aural channels were considered. The channels' modality represents a relevant factor in human information processing, particularly in attention, perception and memory modality specific effects in human information processing are presented and applied to the military applications of voice input and output. There is an increase of the human's ability to divide his attention when different modalities are concerned and different subsystems for spatial and verbal informations are involved. Reaction times are generally smaller for auditory than for visual presentation. There is a superior performance of the short term memory for auditorily presented verbal information, if no verbal informations must be handled during the retention period. It is concluded that if modality compatibility between stimulus and response as well as modality coding compatibility is warranted, time consuming transformations can be avoided. E A K

**N83-18267#** Messerschmitt-Boelkow-Blohm G m b H, Munich (West Germany) Military Aircraft Div

**ERGONOMIC REQUIREMENTS FOR VOICE PROCESSING SYSTEMS**

R SEIFERT and P BUBB /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 13 p Jul 1982 refs

Avail NTIS HC A15/MF A01

Different voice functions and voice generation methods were examined. Voice functions are verbal warning, verbal threat and guidance information, voice transmission and verbal control of system functions. The voice functions of the audio interface are classified as output, output/input, and input functions. Their application and the methods for voice generation and voice recognition are discussed. Ergonomic requirements for voice generation, transmission and recognition techniques are discussed which are derived based on the articulation index assessment and other technical data. Information oriented requirements are needed concerning the coding and the organization of the information. These requirements aim at optimizing the demand on man's information perception and processing capabilities, resulting from the use of various voice functions. E A K

**N83-18268#** Rome Air Development Center, Griffiss AFB, NY  
**APPLICATION, ASSESSMENT AND ENHANCEMENT OF  
 SPEECH RECOGNITION FOR THE AIRCRAFT ENVIRONMENT**  
 R VONUSA, E CUPPLES, S STEIGERWALD, J WOODARD,  
 and J NELSON /in AGARD Advan Avionics and the Mil Aircraft  
 Man/Machine Interface 8 p Jul 1982 refs  
 Avail NTIS HC A15/MF A01

Word recognition devices can be used to narrow the bandwidth of voice communication system are discussed. The degree to which the bandwidth can be narrowed is dependent on the vocabulary size and the input word rate, both of which are dependent on the application. Whether these techniques can apply to a particular voice communication system is highly dependent on the communication system's function and on the ability of the automatic speech recognition (ASR) system to operate accurately in the environment. The use of ASR for narrowband communications in the airborne environment is therefore dependent to a large extent on the ability of the ASR device to perform accurately in the harsh airborne environment. The use of ASR for control of airborne functions, to query avionic systems, and for narrowband air-to-air and air-to-ground communications is operationally highly desirable. However, there are several problems associated with the implementation of ASR in the operational environment. One such problem is that of the noisy environment and its effect on ASR performance. The interest in determining if the speech enhancement technology developed for removing noise and interference contained on voice communication channels can be applied to removing the noise encountered in various other environments. A theoretical measurement method based on information theory was presented that may provide a meaningful ASR measure useful for predicting the performance of a particular ASR device. R J F

**N83-18269#** Marconi Avionics Ltd, Rochester (England) Flight  
 Automation Research Lab  
**DIRECT VOICE INPUT FOR THE COCKPIT ENVIRONMENT**  
 R BELL, M E BENNETT, and W E BROWN /in AGARD Advan  
 Avionics and the Mil Aircraft Man/Machine Interface 7 p Jul  
 1982 refs. Sponsored in part by the United Kingdom Ministry  
 of Defence and the Dept of Industry  
 Avail NTIS HC A15/MF A01

Many aspects of applying speech recognition technology in aircraft cockpits are discussed, particularly the implications of using Direct Voice Input (DVI) in an aircraft, the current capabilities of speech recognition equipment and how DVI will affect pilot activity. Centralized input media of this type affect the structure of the whole avionics suite because of the need for interconnection with many controlled subsystems and the necessity of high integrity operation. The implications of Direct Voice Input (DVI) system integration are discussed. The requirements for a speech recognition system applicable to the cockpit environment are discussed, in particular the problem of noise is discussed and the need for flight trials highlighted. Any equipment used in the cockpit relies on its acceptability to the pilot for success. The pilot interface question is discussed. R J F

**N83-18270#** General Dynamics Corp, Fort Worth, Tex  
**VOICE INTERACTIVE SYSTEM DEVELOPMENT PROGRAM**  
 J C RUTH, A M GODWIN, and E B WERKOWITZ (AFFLD)  
 /in AGARD Advan Avionics and the Mil Aircraft Man/Machine  
 Interface 10 p Jul 1982  
 Avail NTIS HC A15/MF A01

The use of Voice Interactive Systems (VIS) (based on computer recognition and voice synthesis technologies) as a method of achieving an enhanced interaction between the pilot and the weapon systems is discussed. The use of VIS as a viable alternative to the more traditional methods is discussed. Functions which best lend themselves to this approach and offer the highest payoff in terms of overall weapon system performance are discussed. The question of whether the voice recognition technology base can be extended sufficiently to provide reliable operation in the stringent combat aircraft environment is addressed. R J F

**N83-18271#** Army Avionics Research and Development Activity,  
 Fort Monmouth, N J  
**VOICE INTERACTIVE SYSTEMS TECHNOLOGY AVIONICS  
 (VISTA) PROGRAM**  
 L W REED /in AGARD Advan Avionics and the Mil Aircraft  
 Man/Machine Interface 14 p Jul 1982 Presented at the  
 Army Sci Conf, 15-18 Jun 1982 Previously announced as  
 N82-33383

Avail NTIS HC A15/MF A01

The Avionics Research and Development Activity's (AVRADA) program to introduce voice recognition and response into the Army aircraft environment is discussed. Program structure and preliminary testing results are discussed. Software development, computer installation, algorithm development, and voice recognizer testing techniques are discussed. The signal-to-noise ratio was found to be a key factor in recognition accuracy. Another problem arises because of the automatic gain controls (AGC) found in most aircraft intercom systems. When there is no voicing for a period of time, the AGC increases the intercom sensitivity. If the first utterance spoken is intended for the recognizer it will likely be rejected because of the distortion caused by the AGC adjusting the gain during the utterance. This is demonstrated in the test results of all test subjects. No attempt was made to set the AGC before beginning the test, as a result, 90% of the first utterances were rejected which resulted in the lowering of the accuracy score by approximately 4%. The AGC has a release time of 10 seconds and the prompts are issued every second, therefore, after the first utterance the AGC has little effect. Some side tests were performed by making an utterance before signaling the computer to begin the test, and in each case the accuracy of the first test word increased to a point comparable to the other vocabulary words. R J F

**N83-18272#** Crouzet Aerospace and Systems, Valence  
 (France)  
**THE USE OF VOCAL TECHNIQUES IN A COMBAT AIRCRAFT:  
 FIRST INSTRUCTION [UTILISATION DES TECHNIQUES  
 VOCALES DANS UN AVION DE COMBAT: PREMIERS  
 ENSEIGNEMENTS]**

J R COSTET and J M MALTERRE (Centre d'Essais en Vol)  
 /in AGARD Advan Avionics and the Mil Aircraft Man/Machine  
 Interface 8 p Jul 1982

Avail NTIS HC A15/MF A01

The definition of a cockpit with reduced available frontal surface because of the inclination of the pilot's seat is among the several reasons given for growing interest in speech recognition and synthesis for future combat aircraft. Techniques used and problems encountered in a program designed to study and experiment with vocal dialog on such aircraft are described. The program aims to validate the recognition techniques in a military environment, supply data to a data base for defining how, according to what criteria, and what types of functions of vocal dialog can be applied. An ergonomic experiment in a simulator seeks to study the insertion of vocal dialog into a phase of flight corresponding to a realistic workload known in advance. Flight tests are planned to attempt to synthesize on board the aircraft, a modern weapon system with functional dialog and operational functions.

Transl by A R H

**N83-18273#** Royal Air Force Inst of Aviation Medicine,  
 Farnborough (England)  
**PERFORMANCE DECREMENTS ASSOCIATED WITH REACTION  
 TO VOICE WARNING MESSAGES**

J WHEALE /in AGARD Advan Avionics and the Mil Aircraft  
 Man/Machine Interface 12 p Jul 1982 refs

Avail NTIS HC A15/MF A01

Voice warning messages are being adopted as an alternative to audio warnings because they can be readily understood, generate fast reaction times and supposedly allow a smooth transition from message to action. The effectiveness of synthesized voice message using measures of performance decrement and response time in the context of a central warning system with audio, voice and visual indicators was evaluated. The subject's

task was to maintain accuracy on a psychomotor tracking task while responding to warnings. The results show that the various combinations of warning types could not be differentiated with respect to performance decrement on the primary task. The data for reaction time show that audio warnings produce the fastest responses, followed by voice warnings, with central warning panel indicators producing the slowest responses. The implications of the results for the role of synthesized voice warning messages in central warning systems are discussed. R J F

**N83-18274#** Marconi Co Ltd, Basildon (England) Airradio Products Div

## COMMUNICATIONS MANAGEMENT: A VITAL LINK

W E BRIERLEY /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 19 p Jul 1982

Avail NTIS HC A15/MF A01

A method by which additional radio equipment can be fitted to light helicopters, preferably by reduction in the already allocated panel area, together with increased control facilities is investigated. A unit is being designed which will provide the required facilities within a panel area only 35% of that required for the controllers it replaces, whilst still providing all the functions required. The proposed Communications Management System control panel provides in one unit the facilities for two pilots to select control, and display any one of six transmitter-receivers, monitor and/or independently change the frequency or pre-set channel of the selected radio, transmit/receive on the selected radio, select and adjust any or all in any combination eight radio receiver outputs and other audios, monitor and adjust pre-set channels on the left hand display whilst maintaining normal operation on the right hand station, and direct emergency selection of guard channels for UHF, VHF, TAC VHF in the event of system failure. The system is organised to ensure that when a radio is selected, the only frequencies that can be selected are within the particular radio band, or if a pre-set channel is selected, only channels applicable to the selected radio are available. R J F

**N83-18275#** Royal Aircraft Establishment, Farnborough (England) Human Factors Group

## FACTORS AFFECTING THE ALLOCATION OF ATTENTION AND PERFORMANCE IN CROSSMONITORING FLIGHT INFORMATION DISPLAYS

V P SCHMIT /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 6 p Jul 1982 refs Originally announced as 83X-71276

Avail NTIS HC A15/MF A01

Experiments on rapid and continuous visual attention switching between spatially separated aircraft cockpit displays are discussed. It was concluded that reversion to a head-up display (HUD) format imposes a significant time cost (in this experiment 3.5 to 4 seconds) before full appreciation of aircraft status is restored. The HUD format gave more accurate flying performance than the head down instrument (HDI) format. This performance was reduced at reversion, even when reversion was to another HUD format, indicating disruption. Reverting from a HDI format to a HUD format improved performance due to the inherently better display of information on the HUD for the type of flying imposed in this experiment. Reversion from a HDI format took longer when this display had been used for periods longer than 60 seconds - this may be interpreted as the time necessary to establish a scanning pattern and the interference resulting from its disturbance. The results taken as a whole suggest that any reversionary flight display should exhibit minimum scanning requirements, display integrity, and the minimum readjustment required from the pilot at reversion. R J F

**N83-18276#** British Aerospace Aircraft Group, Brough (England)

## THE HEAD UP HANDS BACK CONTROL CONCEPT

G ROE /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 12 p Jul 1982 refs

Avail NTIS HC A15/MF A01

The rationale for a new aircraft control concept is developed by reviewing how current systems are controlled and what operational problems are experienced. Based on discussions of the potential offered by digital data transmission, of intelligent subsystems and a definition of the fundamental human factors requirements, a control concept is presented which requires little, if any head down activities. Results from human factors experiments reveal a consistent trend towards reduced times to complete various complex switch sequences while related errors are reduced. R J F

**N83-18277#** Thomson-CSF, Issy les Moulineaux (France) Dept AVG

## A MORE EXTENDED INTEGRATION FOR COMBAT AIRCRAFT VISUALIZATIONS [UNE INTEGRATION DE PLUS EN PLUS POUSSEE POUR LES VISUALISATIONS DES AVIONS DE COMBAT]

C MAUREAU /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 6 p Jul 1982 In FRENCH

Avail NTIS HC A15/MF A01

Attempts to determine what can be done to significantly improve flight control on combat aircraft practically always result in revealing the need or further extending systems integration. This end is most often obtained by using technological progress particularly information visualization and means at the pilots disposal for exploiting this information. Certain modern equipment in the cabin of the Mirage 2000 aircraft just entering service is reviewed. An analog examination follows on projects for equipping the cabin of a next generation combat aircraft. These projects are elaborated by a working group of equipment suppliers and aircraft designers that was established to integrate systems for future aircraft with the pilots who will use them. Transl by A R H

**N83-18278#** Royal Air Force Inst of Aviation Medicine, Farnborough (England)

## HUMAN FACTORS IN AIRCRAFT KEYBOARD DESIGN: STANDARDS, ISSUES AND FURTHER EVIDENCE RELATING TO GLOVES AND KEY CHARACTERISTICS

R M TAYLOR and J V F BERMAN /in AGARD Advan Avionics and the Mil Aircraft Man/Machine Interface 17 p Jul 1982 refs

Avail NTIS HC A15/MF A01

The aircraft pilot is increasingly required to interact with complex digital avionics systems. These systems often require data to be input in digital form. Keyboards provide a logical and convenient interface for performing this task. Surveys of the literature reveal some human factors evidence relevant to aircraft keyboard design, but most of the work is based on the requirements of ground applications, and this is not readily generalized to aircraft environments. Keyboard factors affecting data entry performance include keyboard positioning and layout, key size, actuation force, pre- and post-actuation travel, visual and tactile feedback, key separation and barriers. Other factors include the effects of aircrew gloves on manipulative ability, tactility and hand/finger dimensions, operator comfort, fatigue and aircraft vibration, the level of skill of the operator, the cognitive and physical components of the data entry task and the interference between keyboard data entry and other tasks performed concurrently in the cockpit. The current status of human factors knowledge in these areas are reviewed and the results of recent experiments conducted at the RAF Institute of Aviation Medicine are discussed in relation to keyboard standardization agreements and aircrew training. B W

**N83-18279#** Systems Research Labs, Inc., Dayton, Ohio  
**PILOT-MACHINE INTERFACE CONSIDERATIONS FOR  
 ADVANCED AIRCRAFT AVIONICS SYSTEMS**

G. L. CALHOUN and E. L. HERRON (General Dynamics) /in  
 AGARD Advan Avionics and the Mil Aircraft Man/Machine  
 Interface 7 p Jul 1982 refs  
 (Contract F33615-73-C-0391, F33615-76-C-0013,  
 F33615-79-C-0503)

Avail NTIS HC A15/MF A01

Aircrew acceptance of computer-driven controls depends largely on the successful establishment of the pilot-machine interface. Research was conducted to determine pilot acceptability and usability of one type of interface device—a multifunction control which integrates many aircraft functions onto a single, easily reached control panel. In each study, pilots completed communications, navigation, and weapons tasks on the control while flying simulated missions. This paper discusses some of the design guidelines identified during the studies as critical to the design of the interface. Topics addressed include how to identify functions to implement on a multifunction control, maximize accessibility of frequently used functions, optimize switch/function assignment, label switches, verify selections, and minimize hand motion and errors. B W

**N83-18280#** Twente Univ of Technology, Enschede  
 (Netherlands)

**LIMITING PERFORMANCE OF THE EYE/DISPLAY SYSTEM**

D. BOSMAN and F. W. UMBACH /in AGARD Advan Avionics  
 and the Mil Aircraft Man/Machine Interface 15 p Jul 1982  
 refs

Avail NTIS HC A15/MF A01

The performance and its limits of the CRT as used in both the recreational sector and professional applications such as aircraft displays, have been extensively researched and described. The new generation of flat panel display devices have image generation properties which are sufficiently different from those of the CRT to require additional ergonomic investigations. In particular, the structural information (spatial domain) does not allow such operations as analogue low pass filtering based on partial overlap of pixels. The image remains tessellated because of the display technology involved, wherein pixels are formed by rectification of the light modulating or emitting display surface. Also a wide dimming range is necessary to ensure good legibility over the whole ambient luminance range as encountered in cockpit environments. These aspects will be given attention with the human visual characteristics as a reference, recommended display specifications are derived. B W

**N83-18281#** Elliott-Automation Space and Advanced Military  
 Systems Ltd., Frimley (England)

**ARCHITECTURE FOR HIGH INTEGRITY DISPLAY SYSTEMS IN  
 FUTURE COMBAT AIRCRAFT**

J. A. GRICE /in AGARD Advan Avionics and the Mil Aircraft  
 Man/Machine Interface 13 p Jul 1982 refs

Avail NTIS HC A15/MF A01

Present indications are that the next generation of combat aircraft will require both Air Defence and Ground Attack capabilities leading to a complex Avionic system. Three different System Architectures have been considered for this complex system with a trend towards a hierarchical system. A Mil-Std-1553B Data Bus has been assumed as the interface standard for the Avionics Bus. Problems of Bus traffic loading, reversionary capability and software location have been investigated. Particular attention has been paid to the Display requirements in terms of number and type of display surfaces and the different display formats are suggested. Some of the implications of giving the pilot flexibility to allocate display formats to different displays are increases in Bus traffic, bus control logic and software. The reliability of the different displays configurations is discussed. Author

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 Wright-Patterson AFB, Ohio

**ELECTROLUMINESCENT LIGHTING AND OTHER TECHNIQUES  
 FOR IMPROVING NIGHT VISION GOGGLES COMPATIBILITY  
 WITH COCKPIT DISPLAYS**

H. L. TASK and L. L. GRIFFIN /in AGARD Advan Avionics and  
 Mil Aircraft Man/Machine Interface 6 p Jul 1982 refs  
 Avail NTIS HC A15/MF A01

Standard night lighting for most aircraft cockpits results in a lighting configuration that is not compatible with the use of night vision goggles. One specific example discussed in this paper is the US Air Force PAVE LOW III helicopter, a modified version of the HH-53H. Both wavelength and geometric light control techniques were developed and applied to this cockpit to make it compatible with the night vision goggles. A combination of light control film (3-M micro-louvre), color filters, infra-red blocking filters, electroluminescent light and anti-flare baffles were used to successfully retrofit the cockpit for night vision goggle use. In addition, some of the techniques are applicable to reducing windscreen reflection, thus, improving unaided night vision through the windscreen. Author

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 Wright-Patterson AFB, Ohio Crew Systems Effectiveness  
 Branch

**THE HELMET-MOUNTED HUD: A CHANGE IN DESIGN AND  
 APPLICATIONS APPROACH FOR HELMET-MOUNTED  
 DISPLAYS**

J. BRIDENBAUGH, W. KAMA, and H. L. TASK /in AGARD Advan  
 Avionics and the Mil Aircraft Man/Machine Interface 6 p Jul  
 1982 refs

Avail NTIS HC A15/MF A01

Recent studies at the USAF Aerospace Medical Research Laboratory (AFAMRL) have been directed at the introduction of a flexible fiber optics bundle (FFOB) to relay alphanumeric/symbolic information from a Cathode Ray Tube (CRT) located off the helmet in order to provide Head-Up Display (HUD) equivalent display information. This approach results in less weight and size, the potential for increased brightness and the removal of high voltage from the helmet. In addition to these improved hardware characteristics several visual problems are avoided by this simple configuration. This paper will examine the rationale for such a design approach as well as present results of laboratory studies to assess the effect of FFOB fiber density on symbol legibility for a Helmet-Mounted Head-Up Display (HMHU). Author

**N83-18284#** Pilkington P.E. Ltd., St Asaph (England)

**DIFFRACTIVE OPTICS FOR AVIONIC DISPLAYS**

D. W. SWIFT /in AGARD Advan Avionics and the Mil Aircraft  
 Man/Machine Interface 8 p Jul 1982

Avail NTIS HC A15/MF A01

The paper describes what diffractive optical elements are, how they work, and how they are made. It explains in broad terms how the properties of one special class of these elements (conformal holograms) are being used to design Head Up Displays with larger instantaneous fields of view than the current generation and with improved photometric performance, but notes some of the attendant problems. Author

**N83-18285#** Royal Aircraft Establishment, Farnborough (England)  
 Flight Systems Dept

**WIDE FIELD OF VIEW HEAD-UP DISPLAYS**

J. R. BANBURY /in AGARD Advan Avionics and the Mil Aircraft  
 Man/Machine Interface 11 p Jul 1982 refs

Avail NTIS HC A15/MF A01

The head-up displays currently fitted to production aircraft have a restricted field of view caused by the relatively small diameter of the collimating optics. There is a growing interest in alternative designs which make a greater field of view available to the pilot. Several possible design options for achieving a wide field are outlined. The new methods usually rely on the properties of diffractive optical elements to achieve a satisfactory performance with respect to accuracy, photometric efficiency and sunlight



rejection Some advantages arising from the particular characteristics of diffractive elements are considered As wide field of view displays become more readily available it is important to establish whether the additional cost and bulk of the equipment is justified by gains in operational efficiency The paper concludes outlining some possible uses of the larger field B W

**N83-18286#** Ferranti Ltd , Edinburgh (Scotland)

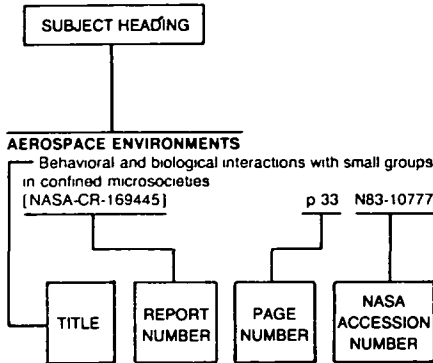
### **THE F18 HORIZONTAL INDICATOR OPTICAL SYSTEM**

A BOOT /n AGARD Advan Avionics and the Mil Aircraft  
Man/Machine Interface 7 p Jul 1982 refs  
Avail NTIS HC A15/MF A01

The design of cockpit displays which are both visible in sunlight, and which whilst visible at night do not significantly interfere with the pilot's normal night time operation present the designer with a significant challenge Such a display outlines the operational environment and the optical performance requirements of the F18 HI, and the technical solutions which have been adopted in order to satisfy these requirements In particular, the means of combining the Map and CRT images and achieving intrinsically high brightness, contrast and resolution figures are discussed, as is the mechanism for generating the accurately controlled exit pupil which impacts significantly on both the high and low ambient illumination performance The use of lightweight fresnel lenses and the associated problems which have been encountered are also highlighted In conclusion, a comparison is drawn between the achievable performance with this and alternative display systems

Author

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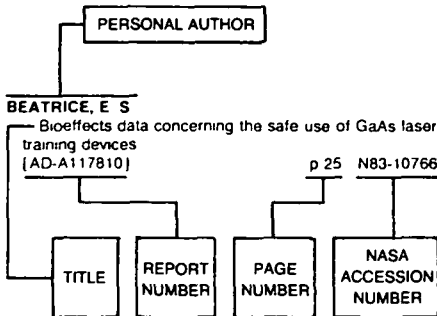
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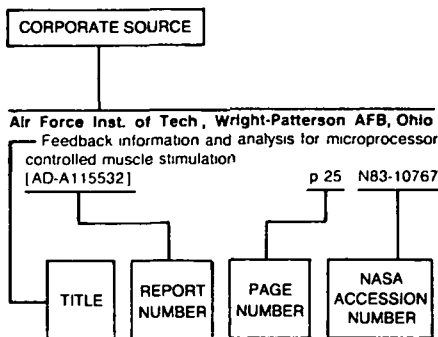
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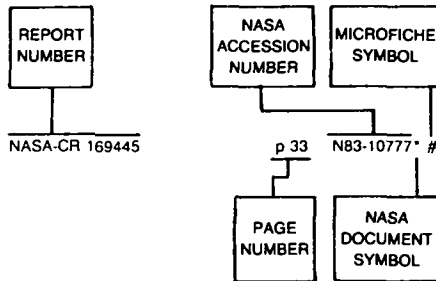
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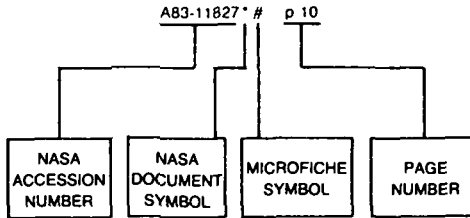
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